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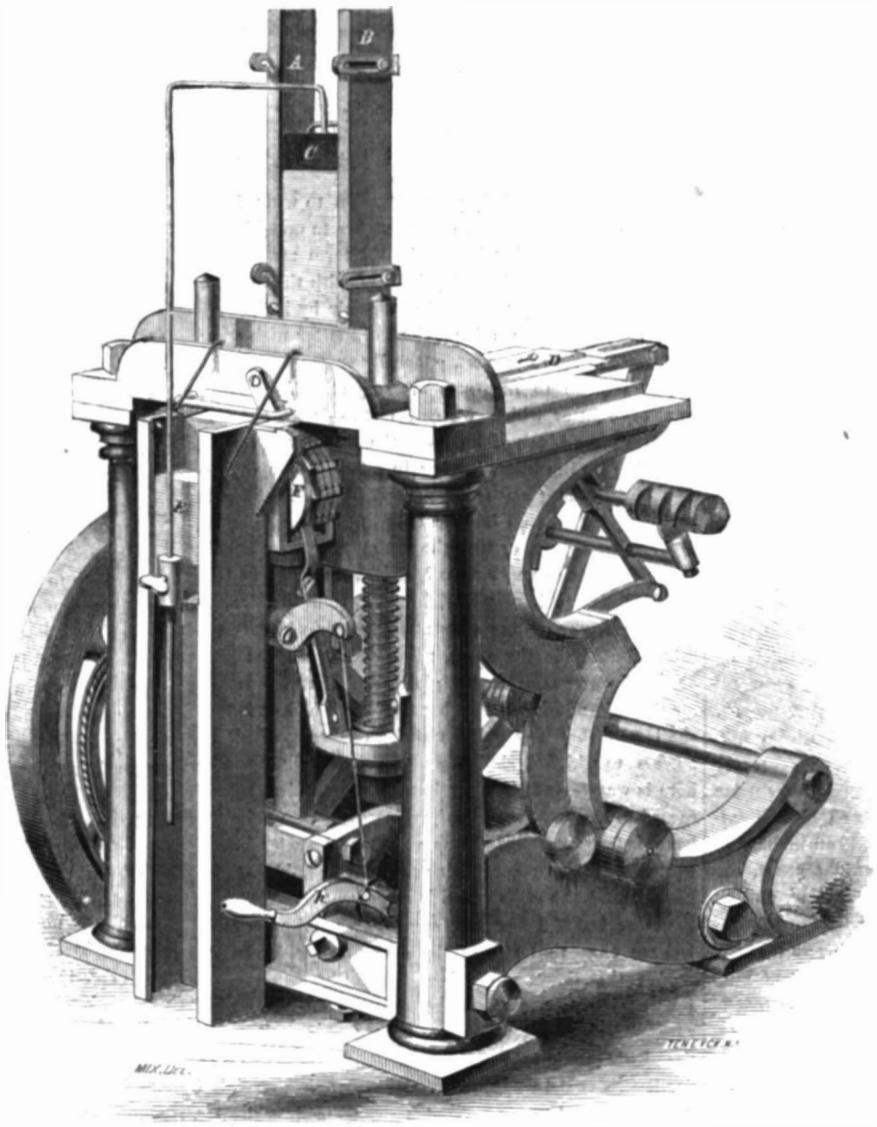
IMPROVED CARD PRESS.

The accompanying engraving represents a press for printing cards, invented by William W. Clarkson, of Baltimore, which feeds the cards to the press automatically, and numbers them as they are printed, or not, at the will of the operator, thus being particularly adapted for printing railroad tickets.

The cards, readily prepared, are placed between the two standards, A and B, and are pressed down by the weight, C. The plate, D, slides back and forth between two guides which have grooves in their edges to admit the edges of the plate, and as the plate is drawn back, the lower card of the pile falls upon supports in the same plane with the guiding grooves. The forward end of the plate is grooved, to receive the edge of the card, and as it moves forward, it pushes the card before it, with the ends of the card between the guiding grooves, into a position directly over the form of type. By the same motion of the machinery, the inking roller is passed over the type, and as the plate and roller return to their places, the form of type is carried up against the lower side of the card, effecting the impression. As each card is carried into place by the plate, D, it pushes before it two of the cards previously printed, one of which falls on the top of the descending pile, E, which is supported by a rod fastened to the weight, C, so that the two piles of cards are lowered equally, and the top of the pile, E, always remains at the same level.

The numbering wheels, F, are of the well known plan; several disks, each with the nine digits and a cypher upon its periphery, are so connected together that the revolution of one shall turn its next neighbor one notch, while the right-hand disk is turned one notch for each card. A pawl, *g*, is so placed as to turn the numbering wheel one notch on each descent of the form. By turning the lever, *h*, the numbering wheel is so lowered as to be out of reach of the inking roller, preventing its being carried up against the card, thus throwing the numbering apparatus out of gear.



CLARKSON'S IMPROVED CARD PRESS.

The several motions in this machine are all effected by means of two cams, or rather, by means of two grooves in the face of one wheel, and the motions are not only absolutely positive, but are very smooth, and the machine works in the most perfect and admirable manner. A manufacturer of card-printing presses, and withal a practical printer and inventor of no ordinary ability, critically examined the press from which the annexed engraving was taken, in our office, and he pronounced it, without hesitation, an excellent press.

The patent for this invention was granted on the 27th of April, 1860, and further information in relation to it may be obtained by addressing Jos. Clarkson & Son, 75 North Front-street, Baltimore, Md.

THE MECHANICAL THEORY OF HEAT.

The mechanical theory of heat is simply this. All gases and vapors are supposed to consist of numerous small atoms, moving or vibrating in all directions with great rapidity, pressure being produced by these atoms striking against the sides of the vessel containing the gas. The greater the number of these atoms, or the greater their aggregate weight, in a given space, and the higher the velocity, the greater is the pressure. An increase or decrease of temperature is simply an increase or decrease of molecular motion. In other words, heating a gas, by friction or any other means, is simply increasing the velocity of the atoms in their constant vibrations.

When a gas is confined in a cylinder under a piston, so long as no motion is given to the piston, the atoms, in striking, will rebound from the piston, after impact, with the same velocity with which they approached it, and no motion will be lost by the atoms. But when the piston yields to the pressure, the atoms will not rebound from it with the same velocity with which they strike, but will return, after each succeeding blow, with a velocity continually decreasing as the piston continues to recede, and the length of the vibrations will be diminished. The motion gained by the piston will, it is obvious, be precisely equivalent to the energy, heat, or molecular motion lost by the atoms of the gas. Vibratory motion or heat being converted into its equivalent of onward motion, or dynamical effect, the conversion of heat into power, or of power into heat, is thus simply a transference of motion; and it would be as reasonable to expect one billiard-ball to strike and give motion to another without losing any of its own motion, as to suppose that the piston of a steam engine can be set in motion without a corresponding quantity of energy being lost by some other body.

In expanding air spontaneously to a double volume, delivering it, say, into a vacuous space, it has been proved repeatedly that the air does not fall appreciably in temperature, no external work being performed; but, on the contrary, if the air at a temperature, say, of 230° Fah., be expanded under pressure or resistance, as against the piston of a cylinder, giving motion to it, raising a weight, or otherwise doing work by giving motion to some other body, the temperature will fall nearly 170° when the volume is doubled; that is, from 230° to about 60°, and, taking the initial pressure of 40 pounds, the final pressure would be 15 pounds per square inch.

When a pound weight of air, in expanding at any temperature or pressure, raises 130 pounds one foot high, it loses one degree in temperature; in other words this pound of air would lose as much molecular energy as would equal the energy acquired by a weight of one pound falling through a hight of 130 feet. It must, however, be remarked that but a small portion of this work, 130 foot-pounds, can be had as available work, as the heat which disappears does not depend on the amount of work or duty realized, but upon the total of the opposing forces, including all resistance from any external source whatever. When air is compressed, the atmosphere decends and follows the piston, assisting in the operation with its whole weight; and when the air is expanded, the motion of the piston is, on the contrary, opposed by the whole weight of the atmosphere, which is again elevated. Although, therefore, in expanding air, the heat which disappears is in proportion to the total opposing force, it is much in excess of what can be rendered available; and commonly, where air is compressed, the heat generated is much greater than that which is due to the work which is required to be expended, the weight of the atmosphere assisting in the operation.

IT is now thought that nitrogen is an essential element of steel.

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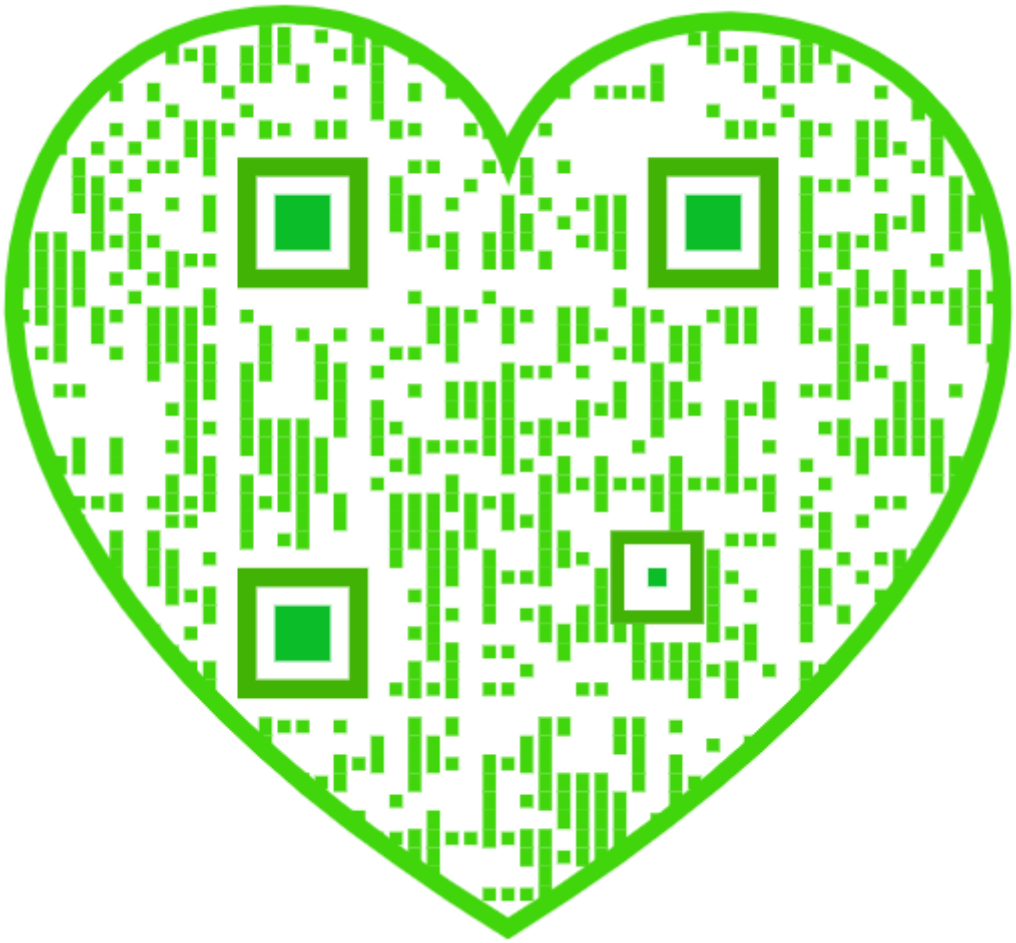

SCIENCE MADE POPULAR.

PROFESSOR FARADAY'S LECTURES ON THE PHYSICAL FORCES.

LECTURE 1.—THE FORCE OF GRAVITATION.

Let us consider, for a little while, how wonderfully we stand upon this world. Here it is we are born, bred and live, and yet we view these things with an almost entire absence of wonder to ourselves respecting the way in which this all happens. So small, indeed, is our wonder, that we are never taken by surprise; and I do think that, to a young person of 10, 15 or 20 years of age, perhaps the first sight of a cataract or a mountain would occasion him more surprise than he had ever felt concerning the means of his own existence; how he came here, how he lives, by what means he stands upright, and through what means he moves about from place to place. Hence, we come into this world, we live, and depart from it, without our thoughts being called specifically to consider how all this takes place; and were it not for the exertions of some few inquiring minds, who have looked *into* these things, and ascertained the very beautiful laws and conditions by which we *do* live and stand upon the earth, we should hardly be aware that there was anything wonderful in it. These inquiries, which have occupied philosophers from the earliest days, when they first began to find out the laws by which we grow and exist and enjoy ourselves, up to the present time, have shown us that all this was effected in consequence of the existence of certain forces, or abilities to do things, or powers, that are so common that nothing can be more so; for nothing is commoner than the wonderful powers by which we are enabled to stand upright—they are essential to our existence every moment.

It is my purpose to make you acquainted with some of these powers; not the vital ones, but some of the more elementary, and what we call *physical* powers; and, in the outset, what can I do to bring to your minds a notion of neither more nor less than that which I mean by the word *power* or *force?* Suppose I take this sheet of paper and place it upright on one edge, resting against a support before me (as the roughest possible illustration of something to be disturbed), and suppose I then pull this piece of string which is attached to it. I pull the paper over. I have therefore brought into use a power of doing so—the power of my hand carried on through this string in a way which is very remarkable when we come to analyze it; and it is by means of these powers conjointly (for there are several powers here employed) that I pull the paper over. Again: if I give it a push upon the other side, I bring into play a power, but a very different exertion of power from the former; or, if I take now this bit of shellac [a stick of shellac about 12 inches long and 1½ in diameter], and rub it with flannel, and hold it an inch or so in front of the upper part of this upright sheet, the paper is immediately moved toward the shellac, and by now drawing the latter away, the paper falls over without having been touched by anything. You see, in the first illustration I produced an effect than which nothing could be commoner; I pull it over now, not by means of that string or the pull of my hand, but by some action in this shellac. The shellac, therefore, has a power wherewith it acts upon the sheet of paper; and, as an illustration of the exercise of another kind of power, I might use gunpowder with which to throw it over.

Now I want you to endeavor to comprehend that when I am speaking of a power or force, I am speaking of that which I used just now to pull over this piece of paper. I will not embarrass you at present with the *name* of that power, but it is clear there was a *something* in the shellac which acted by attraction and pulled the paper over; this, then, is one of those things which we call power or force; and you will now be able to recognize it as such in whatever form I show it to you. We are not to suppose that there are so very many different powers; on the contrary, it is wonderful to think how few are the powers by which all the phenomena of nature are governed. There is an illustration of another kind of power in that lamp; *there* is a power of heat—a power of doing something, but not the same power as that which pulled the paper over; and so, by degrees, we find that there are certain other powers (not many) in the various bodies around us; and thus, beginning with the simplest experiments of pushing and pulling, I shall proceed to distinguish these powers one from the other, and compare the way in which they combine together. This world upon which we stand (and we have not much need to travel out of the world for illustrations of our subject; but the mind of man is not confined like the matter of his body, and thus he may and does travel outward, for, wherever his sight can pierce, there his observations can penetrate) is pretty nearly a round globe, having its surface disposed in a manner of which this terrestial globe by my side is a rough model; so much is land and so much is water; and, by looking at it here, we see in a sort of map or picture how the world is formed upon its surface. Then, when we come to examine farther, I refer you to this sectional diagram of the geological strata of the earth, in which there is a more elaborate view of what is beneath the surface of our globe. And, when we come to dig into or examine it (as man does for his own instruction and advantage, in a variety of ways), we see that it is made up of different kinds of matter, subject to a very few powers; and all disposed in this strange and wonderful way, which gives to man a history—and such a history—as to what there is in those veins, in those rocks, the ores, the water-springs, the atmosphere around, and all varieties of material substances, held together by means of forces in one great mass, 8,000 miles in diameter, that the mind is overwhelmed in contemplation of the wonderful history related by these strata (some of which are fine and thin, like sheets of paper), all formed in succession by the forces of which I have spoken.

I now shall try to help your attention to what I may say by directing, to-day, our thoughts to one kind of power. You see what I mean by the term *matter*—any of these things that I can lay hold of with the hand, or in a bag (for I may take hold of the air by inclosing it in a bag)—they are all portions of matter with which we have to deal at present, generally or particularly, as I may require to illustrate my subject. Here is the sort of matter which we call *water*—it is *there* ice [pointing to a block of ice upon the table], *there* water [pointing to the water boiling in a flask], *here* vapor—you see it issuing out from the top (of the flask). Do not suppose that that ice and that water are two entirely different things, or that the steam rising in bubbles and ascending in vapor *there* is absolutely different from the fluid water; it may be different in some particulars, having reference to the amounts of power which it contains; but it is the same, nevertheless, as the great ocean of water around our globe, and I employ it here for the sake of illustration, because if we look into it we shall find that it supplies us with examples of all the powers to which I shall have to refer. For instance, here is water—it is heavy; but let us examine it with regard to the *amount* of its heaviness or its gravity. I have before me a little glass vessel and scales [nearly equipoised scales, one of which contained a half-pint glass vessel], and the glass vessel is at present the lighter of the two; but if I now take some water and pour it in, you see that that side of the scales immediately goes down; that shows you (using common language, which I will not suppose that you have hitherto applied very strictly) that it is *heavy*, and if I put this additional weight into the opposite scale, I should not wonder if this vessel would hold water enough to weigh *it* down. [The lecturer poured more water into the jar, which again went down.] Why do I hold the bottle above the vessel to pour the water into it? You will say, because experience has taught me that it is necessary. I do it for a better reason—because it is a law of nature that the water should fall toward the earth, and therefore the very means which I use to cause the water to enter the vessel are those which will carry the whole body of water down. That power is what we call *gravity*, and you see *there* [pointing to the scales] a good deal of water gravitating toward the earth. Now *here* [exhibiting a small piece of platinum(2)] is another thing which gravitates toward the earth as much as the whole of that water. See what a little there is of it; that little thing is heavier than so much water [placing the metal in opposite scales to the water]. What a wonderful thing it is to see that it requires so much water as that [a half-pint vessel full] to fall toward the earth, compared with the little mass of substance I have here! And again: if I take this metal [a bar of aluminum(3) about eight times the bulk of the platinum], we find the water will balance that as well as it did the platinum; so that we get, even in the very outset, an example of what we want to understand by the words "forces" or "powers."

I have spoken of water, and first of all, of its property of falling downward; you know very well how the oceans surround the globe—how they fall round the surface, giving roundness to it, clothing it like a garment; but, besides that, there are other properties of water. *Here*, for instance, is some quicklime, and if I add some water to it, you will find another power or property in the water.(4) It is now very hot—it is steaming up; and I could perhaps light phosphorous or a lucifer-match with it. Now that could not happen without a force in the water to produce the result; but that force is entirely distinct from its power of falling to the earth. Again: here is another substance [some anhydrous sulphate of copper (5)] which will illustrate another kind of power. [The lecturer here poured some water over the white sulphate of copper, which immediately became blue, evolving considerable heat at the same time.] Here is the same water with a substance which heats nearly as much as the lime does—but see how differently. So great, indeed, is this heat in the case of lime, that it is sufficient sometimes (as you see here) to set wood on fire; and this explains what we have sometimes heard, of barges laden with quicklime taking fire in the middle of the river, in consequence of this power of heat brought into play by a leakage of the water into the barge. You see how strangely different subjects for our consideration arise when we come to think over these various matters—the power of heat evolved by acting upon lime with water, and the power which water has of turning this salt of copper from white to blue.

I want you now to understand the nature of the most simple exertion of this power of matter called *weight* or *gravity*. Bodies are heavy; you saw that in the case of water when I placed it in the balance. Here I have what we call a *weight* [an iron half cwt.]—a thing called a weight, because in it the exercise of that power of pressing downward is especially used for the purposes of weighing; and I have also one of these little inflated India-rubber bladders, which are very beautiful although very common (most beautiful things are common), and I am going to put the weight upon it to give you a sort of illustration of the downward pressure of the iron, and of the power which the air possesses of resisting that pressure; it may burst, but we must try to avoid that. [During the last few observations, the lecturer had succeeded in placing the half cwt. in a state of quiescence upon the inflated india-rubber ball, which consequently assumed a shape very much resembling a flat cheese with round edges.] There you see a bubble of air bearing half a hundred-weight, and you must conceive for yourselves what a wonderful power there must be to pull this weight downward to sink it thus in the ball of air.

Let me now give you another illustration of this power. You know what a pendulum is. I have one here (Fig. 1), and if I set it swinging, it will continue to swing to and fro. Now I wonder whether you can tell me why that body oscillates to and fro—that "pendulum bob," as it is sometimes called. Observe, if I hold the straight stick horizontally, as high as the position of the ball at the two ends of its journey, you see that the ball is in a higher position at the two extremities than it is when in the middle. Starting from one end of the stick, the ball falls toward the center, and then rising again to the opposite end, it constantly tries to fall to the lowest point, swinging and vibrating most beautifully, and with wonderful properties in other respects—the time of its vibration, and so on—but concerning which we will not now trouble ourselves.

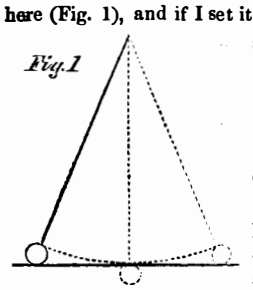
Fig. 1

If a gold leaf or piece of thread, or any other substance, were hung where this ball is, it would swing to and fro in the same manner, and in the same time, too. Do not be startled at this statement; I repeat it, in the same manner and in the same time, and you will see by-and-by how this is. Now that power which caused

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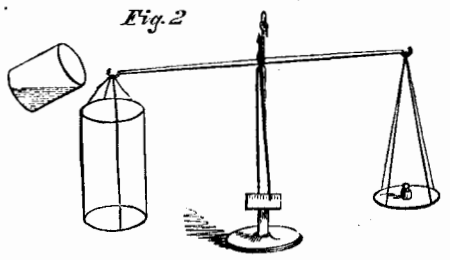
the water to descend in the balance—which made the iron weight press upon and flatten the bubble of air—which caused the swinging to and fro of the pendulum, that power is entirely due to the attraction which there is between the falling body and the earth. Let us be slow and careful to comprehend this. It is not that the earth has any *particular* attraction toward bodies which fall to it, but that *all* these bodies possess an attraction every one toward the other. It is not that the earth has any special power which these balls themselves have not; for just as much power as the earth has to attract these two balls [dropping two ivory balls], just so much power have they in proportion to their bulks to draw themselves one to the other; and the only reason why they fall so quickly to the earth is owing to its greater size. Now, if I were to place these two balls near together, I should not be able, by the most delicate arrangement of apparatus, to make you or myself sensible that these balls did attract one another; aud yet we know that such is the case, because if, instead of taking a small ivory ball, we take a mountain, and put a ball like this near it, we find that, owing to the vast size of the mountain as compared with the billiard ball, the latter is drawn slightly toward it, showing clearly that an attraction *does* exist, just as it did between the shellac which I rubbed and the piece of paper which was overturned by it.

Now it is not very easy to make these things quite clear at the outset, and I must take care not to leave anything unexplained as I proceed; and, therefore, I must make you clearly understand that all bodies are attracted to the earth—or, to use a more learned term, *gravitate*. You will not mind my using this word, for

Fig. 2



when say that this penny-piece gravitates, I mean nothing more nor less than that it falls toward the earth, and, if not intercepted, it would go on falling, falling, until it arrived at what we call the *center of gravity* of the earth, which I will explain to you by-and-by.

I want you to understand that this property of gravitation is never lost; that every substance possesses it; that there is never any change in the quantity of it; and, first of all, I will take as illustration a piece of marble. Now this marble has weight, as you will see if I put it in these scales; it weighs the balance down, and if I take it off, the balance goes back again and resumes its equilibrium. I can decompose this marble, and change it in the same manner as I can change ice into water and water into steam. I can convert a part of it into its *own* steam easily, and show you that this steam from the marble has the property of remaining in the same place at common temperatures, which *water* steam has not. If I add a little liquid to the marble and decompose it(6), I get that which you see [the lecturer here put several lumps of marble into a glass jar, and poured water and then acid over them; the carbonic acid immediately commenced to escape, with considerable effervescence], the appearance of boiling, which is only the separation of one part of the marble from another. Now this [marble] steam, and that [water] steam, and all other steams, gravitate just like any other substance does; they all are attracted the one toward the other, and all fall toward the earth; and what I want you to see is, that *this* steam gravitates. I have here (Fig. 2) a large vessel placed upon a balance, and the moment I pour this steam into it you see that the steam gravitates. Just watch the index, and see whether it tilts over or not. [The lecturer here poured the carbonic acid out of the glass in which it was being generated into the vessel suspended on the balance, when the gravitation of the carbonic acid was at once apparent.] Look how it is going down. How pretty that is! I poured nothing in it but the invisible steam or vapor or gas which came from the marble; but you see that part of the marble, although it has taken the shape of air, still gravitates as it did before. Now will it weigh down that bit of paper? [placing a piece of paper in the opposite scale.] Yes, more than that; it nearly weighs down this bit of paper [placing another piece of paper in]. And thus you see that *other* forms of matter besides solids and liquids tend to fall to the earth; and, therefore, you will accept from me the fact that all things gravitate, whatever may be their form or condition. Now here is another chemical test which is very readily applied. [Some of the carbonic acid was

Fig. 3

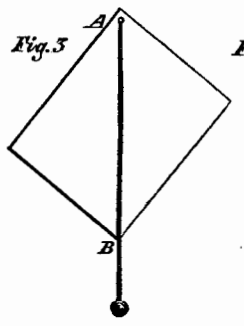
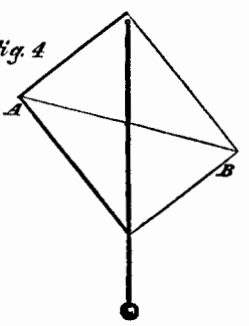


Fig. 4



poured from one vessel into another, and its presence in the latter shown by introducing into it a lighted taper, which was immediately extinguished.] You see from this result, also, that it gravitates. All these experiments show you that, tried by the balance, tried by pouring like water from one vessel to another, this steam or vapor or gas is, like all other things, attracted to the earth.

There is another point I want, in the next place, to draw your attention to. I have here a quantity of shot; each of these falls separately, and each has its own gravitating power, as you perceive when I let them fall loosely on a sheet of paper. If I put them into a bottle, I collect them together as one mass, and philosophers have discovered that there is a certain point in the middle of the whole collection of shots that may be considered as the one point in which all their gravitating power is centered, and that point they call the center of gravity; it is not at all a bad name, and rather a short one—the "center of gravity." Now suppose I take a sheet of pasteboard, or any other thing easily dealt with, and run a brad-awl through it at one corner, A (Fig. 3), and Mr. Anderson hold that up in his hand before us, and I then take a piece of thread and an ivory ball and hang that upon the awl, then the center of gravity of both the pasteboard and the ball and string are as near as they can get to the center of the earth; that is to say, the whole of the attracting power of the earth is, as it were, centered in a single point of the cardboard, and this point is exactly below the point of suspension. All I have to do, therefore, is to draw a line, A B, corresponding with the string, and we shall find that the center of gravity is somewhere in that line. But where? To find that out, all we have to do is to take another place for the awl (Fig. 4), hang the plumb-line, and make the same experiment, and there [at the point C] is the center of gravity—there where the two lines which I have traced cross each other; and if I take that pasteboard, and make a hole with the

Fig. 5

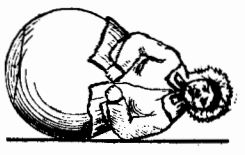
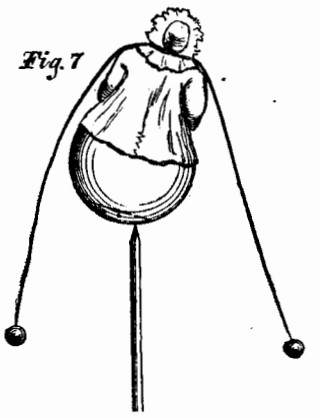


Fig. 6

brad-awl through it at that point, you will see that it will be supported in any position in which it may be placed. Now, knowing that, what do I do when I try to stand upon one leg? Do you not see that I push myself over to the left side, and quietly take up the right leg, and thus bring some central point in my body over this left leg? What is that point which I throw over? You will know at once that it is the center of gravity—that point in me where the whole gravitating force of my body is centered, and which I thus bring in a line over my foot.

Here is a toy I happened to see the other day, which will, I think, serve to illustrate our subject very well. That toy *ought* to lie something in this manner (Fig. 5), and would do so if it were uniform in substance; but you see it does not; it will get up again. And now philosophy comes to our aid; and I am perfectly sure, without looking inside the figure, that there is some arrangement by which the center of gravity is at the lowest point when the image is standing upright; and we may be certain when I am tilting it over (see Fig. 6) that I am lifting up the center of gravity, *a*, and raising it from the earth. All this is effected by putting a piece of lead inside the lower part of the image and making the base of large curvature, and there you have the whole secret. But what will happen if I try to make the figure stand upon a sharp point? You observe I must get that point *exactly* under the center of gravity, or it will fall over thus [endeavoring, unsuccessfully, to balance it]; and this, you see, is a difficult matter; I cannot make it stand steadily; but if I embarrass this poor old lady with a world of trouble, and hang this wire with bullets at each end about her neck, it is very evident that, owing to there being those balls of lead hanging down on either side, in addition to the lead inside, I have lowered the center of gravity, and now she will stand upon this point (Fig. 7); and, what is more,

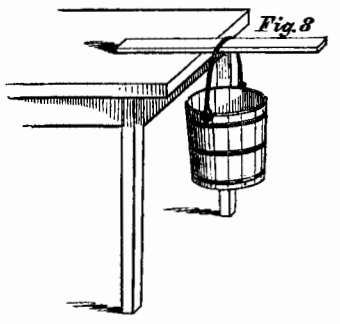
Fig. 7



she proves the truth of our philosophy by standing sideways.

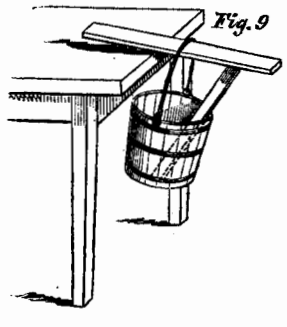
I remember an experiment which puzzled me very much when a boy. I read it in a conjuring book, and this was how the problem was put to us:—"How," as the book said, "how to hang a pail of water, by means of a stick, upon the side of a table" (Fig. 8). Now I

Fig. 8



have here a table, a piece of stick and a pail, and the proposition is, how can that pail be hung to the edge of this table? It is to be done; and can you at all anticipate what arrangement I shall make to enable me to succeed? Why, this. I take a stick, and put it in the pail between the bottom and the horizontal piece of wood, and thus give it a stiff handle, and there it is; and, what is more, the more water I put into the pail, the better it will hang. It is very true that before I quite succeeded, I had the misfortune to push the bottoms of several pails out; but here it is hanging firmly

Fig. 9



(Fig. 9), and you now see how you can hang up the pail in the way which the conjuring books require.

Again: if you are really so inclined (and I do hope

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all of you are), you will find a great deal of philosophy in this [holding up a cork and a pointed, thin stick, about a foot long]. Do not refer to your toy-books, and say you have seen that before. Answer me, rather, if I ask you, have you *understood* it before? It is an experiment which appeared very wonderful to me when I was a boy. I used to take a piece of cork (and I remember I thought at first that it was very important that it should be cut out in the shape of a man; but, by degrees, I got rid of that idea), and the problem was to balance it on the point of a stick. Now, you will see that I have only to place two sharp-pointed sticks, one on each side, and give it wings, thus, and you will find this beautiful condition fulfilled.

We come now to another point. All bodies, whether heavy or light, fall to the earth by this force which we call gravity. By observation, moreover, we see that bodies do not occupy the same time in falling; I think you will be able to see that this piece of paper and that ivory ball fall with different velocities to the table [dropping them]; and if, again, I take a feather and an ivory ball, and let them fall, you see they reach the table or earth at different times; that is to say, the ball falls faster than the feather. Now that should not be so; for all bodies do fall equally fast to the earth. There are one or two beautiful points included in that statement. First of all, it is manifest that an ounce, or a pound, or a ton, or a thousand tuns, all fall equally fast, no one faster than another: here are two balls of lead, a very light one and a very heavy one, and you perceive they both fall to the earth in the same time. Now, if I were to put into a little bag a number of these balls, sufficient to make up a bulk equal to the large one, they would also fall in the same time; for if an avalanche fall from the mountain, the rocks, snow and ice, together falling toward the earth, fall with the same velocity, whatever be their size.

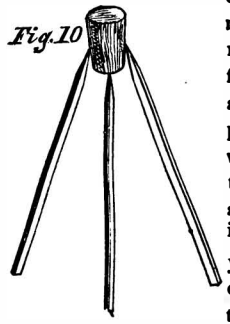


Fig. 10

I cannot take a better illustration of this than that of gold leaf, because it brings before us the reason of this apparent difference in the time of the fall. Here is a piece of gold leaf. Now, if I take a lump of gold and this gold leaf, and let them fall through the air together, you see that the lump of gold—the sovereign or coin—will fall much faster than the gold leaf. But why? They are both gold, whether soverign or gold leaf. Why should they not fall to the earth with the same quickness? They would do so, but that the air around our globe interferes very much where we have the piece of gold so extended and enlarged as to offer much obstruction on falling through it. I will, however, show you that gold leaf *does* fall as fast when the resistance of the air is excluded; for if I take a piece of gold leaf and hang it in the center of a bottle, so that the gold and the bottle and the air within shall all have an equal chance of falling, then the gold leaf will fall as fast as anything else. And if I suspend the bottle containing the gold leaf to a string, and set it oscillating like a pendulum, I may make it vibrate as hard as I please, and the gold leaf will not be disturbed, but will swing as steadily as a piece of iron would do; and I might even swing it round my head with any degree of force, and it would remain undisturbed. Or I can try another kind of experiment: if I raise the gold leaf in this way [pulling the bottle up to the ceiling of the theater, by means of a cord and pulley, and then suddenly letting it to fall within a few inches of the lecture table], and allow it then to fall from the ceiling downward (I will put something beneath to catch it, supposing I should be *maladroit*), you will perceive that the gold leaf is not in the least disturbed. The resistance of the air having been avoided, the glass bottle and gold leaf all fall exactly in the same time.

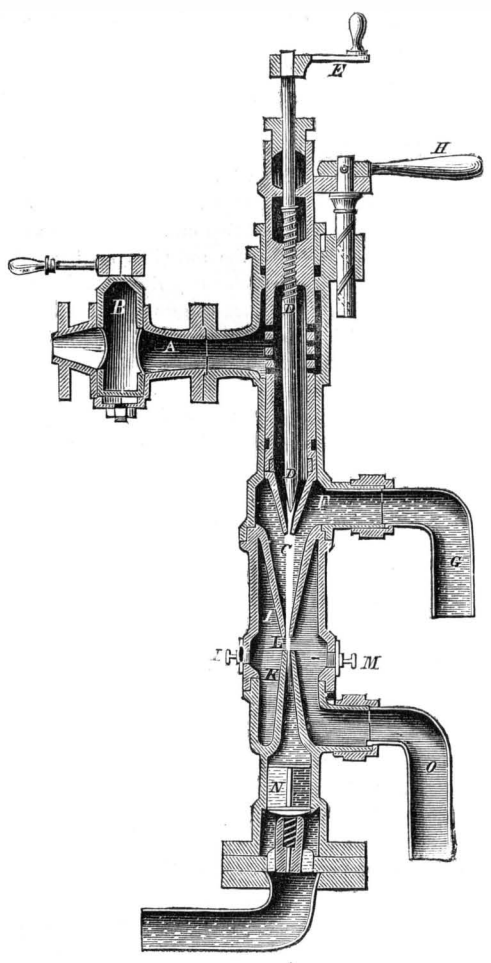
Here is another illustration: I have hung a piece of gold leaf in the upper part of this long glass vessel, and I have the means, by a little arrangement at the top, of letting the gold leaf loose. Before we let it loose, we will remove the air by means of an air-pump, and, while that is being done, let me show you another experiment of the same kind. Take a penny-piece, or a half-crown, and a round piece of paper a trifle smaller in diameter than the coin, and try them side by side to see whether they fall at the same time [dropping them]. You see they do not—the penny-piece goes down first. But now place this paper flat on the top of the coin, so that it shall not meet with any resistance from the air, and upon *then* dropping them, you see they *do* both fall in the same time [exhibiting the effect]. I dare say, if I were to put this gold leaf, instead of the paper, on the coin, it would do as well. It is very difficult to lay the gold leaf so flat that the air shall not get under it and lift it up in falling, and I am rather doubtful as to the success of this, because the gold leaf is puckery, but will risk the experiment. There they go together [letting them fall], and you see at once that they both reach the table at the same moment.

We have now pumped the air out of the vessel, and you will perceive that the gold leaf will fall as quickly in this vacuum as the coin does in the air. I am now going to let it loose, and you must watch to see how rapidly it falls. There [letting the gold loose]; there it is, falling as gold should fall.

I am sorry to see our time for parting is drawing so near. As we proceed, I intend to write upon the board behind me certain words, so as to recall to your minds what we have already examined, and I put the word FORCES as a heading, and I will then add beneath the names of the special forces, according to the order in which we consider them; and, although I fear that I have not sufficiently pointed out to you the more important circumstances connected with the force of GRAVITATION, especially the law which governs its attraction (for which, I think, I must take up a little time at our next meeting); still, I will put that word on the board, and hope you will now remember that we have, in some degree, considered the force of gravitation—that force which causes all bodies to attract each other when they are at sensible distances apart, and tends to draw them together.

GIFFARD'S INJECTOR.

Let no man hereafter conclude, by mere reasoning, that anything cannot be done. That a pipe coming out of the top of a steam boiler should be able, by the mere force of the steam rushing out of it, to blow water



through another pipe right back into the same boiler, without the intervention of any machinery, and thus keep up the supply of water in the boiler, would, most assuredly, have been pronounced impossible by all the philosophers in the world. And yet there are large numbers of steam engines running at this time, the boilers of which are supplied by this process. We gave a description of the apparatus on page 162 of the current volume; but it is so very novel and peculiar that, finding an engraving of it in its most improved form, in the London *Mechanics' Magazine*, we have decided to reproduce it for the benefit of our readers.

The steam from the boiler is admitted through the pipe, A, furnished with a cock, B, and passes down through the perforated cylinder or tube, C, which is made conical at the bottom; the area of the aperture being regulated by the conical rod, D, adjusted by the screw and handle, E. The jet of steam issuing from the orifice of the tube, C, encounters the feed-water in the chamber, F, which enters either from a head of water, or by the aspiration of the apparatus itself, from a tank placed near; from the feed-pipe, G, the supply of feed-water is regulated by raising or lowering the tube, C, by means of the handle, H, and screw of quick pitch. The stream of feed-water propelled by the steam jet issues from the upper orifice, I, and passes into the mouth of the lower pipe, K, leading into the boiler; the intervening space, L, being open to the atmosphere, so that the stream of water can be seen through the sight-holes, M, at this part of the passage. While the injector is at work, a check valve is inserted at N, to prevent the return of water from the boiler when the injector is not working. The overflow pipe carries off any overflow occasioned in starting the injector to work, and the sight-holes, M, are covered by a circular slide.

In starting the injector to work, the handle, H, is first turned into the position suited to the pressure of steam in the boiler; this permits the access of water to the instrument, and regulates its admission. The steam cock, B, is then opened, and the handle, E, turned slightly, so as to elevate the screwed rod, D, which admits a small quantity of steam to the conical opening, I; a partial vacuum is thus produced in the chamber, F, by the rush of steam through the opening, I, and the water flows into it. As soon as this happens, which can be seen by the issue of water from O, the screwed rod, D, is gradually raised until the overflow ceases; thus giving full liberty to the steam to act upon the water at L, and drive it into the boiler through the pipe, K, and the valve, N.

There has been much discussion as to the theory of the action of this wonderful apparatus. Our own explanation is simply this: as the steam in the pipe comes in contact with the cold water, it is condensed, forming a vacuum, into which the steam, under high pressure in the boiler, rushes with tremendous velocity, acquiring sufficient momentum not only to carry itself back into the boiler, but also to carry along with it any particles of water with which it may come in contact on its way.

THE SUBTLETY OF POISONS.—At a recent discussion before the Society of Arts in London on the detection of arsenical poisoning, Dr. Letheby traced the progress of toxicological research from the trial of Donald, in 1815, up to the present time. A little while before that period, *ten grains* of arsenic were required to make a metallic test satisfactory in a court of law. Afterwards, Dr. Black improved the process till he could detect the poison if he had *one grain* to operate upon. It was then thought a marvel of toxicological skill when Dr. Christison said he only required the sixteenth of a grain; but now we can trace the presence of the 250,000,000th of a grain of arsenic! It is to be feared that the detection of this particular poison has reached an almost dangerous degree of delicacy, and extreme caution is necessary in examination for its criminal administration. We live surrounded by means of unconsciously absorbing traces of arsenic; we breathe arsenicated dust from the green wall papers of our rooms; the confectioners supply it wholesale in their cake ornaments and sweetmeats; the very drugs prescribed for our relief are tainted with arsenic; nay, more, even our vegetable food, as Professor Davy has lately pointed out, may be contaminated with arsenic; and there is probably no drinking water containing iron without a trace of arsenic as well. The poison may thus be stored up in the system till, in the course of years, the amount becomes appreciable.

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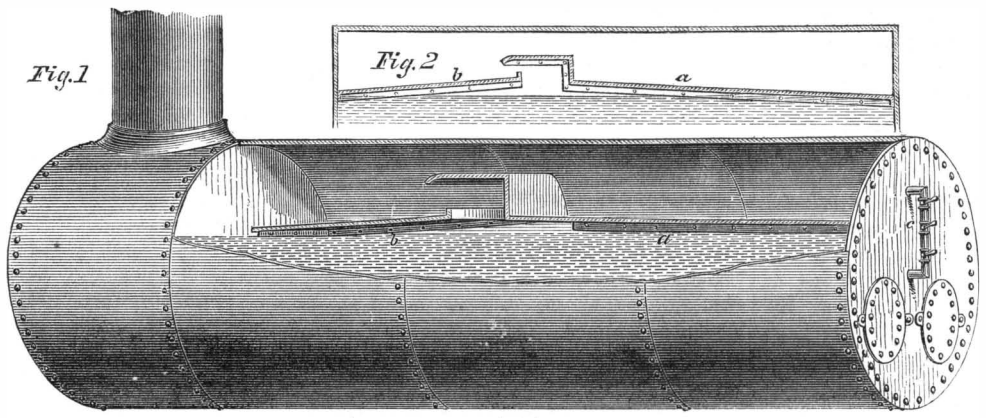
IMPROVED FOAM COLLECTOR.

One of the difficulties frequently met with in running steam engines, is the production of large quantities of foam which, being driven by the force of the steam into the steam-pipe, carries to the chest and cylinder considerable quantities of water, impeding the action of the engine, and sometimes breaking it in pieces. This operation has received the technical name of "priming," and various plans have been tried to prevent its occurrence. The one which we here illustrate is exceedingly simple, and would seem to be well calculated to accomplish its purpose.

It consists in placing two iron plates over the water, with their edges riveted steam-tight to the inner sides of the boiler, and their ends inclined downward to the ends of the boiler. These plates are represented in the annexed cuts, of which Fig. 1 is a perspective of the boiler partly broken away to show the inside, and Fig. 2 is a vertical section. The end of plate, *a*, rises over the end of plate, *b*, as shown, and a stop-cock is to be inserted in each end of the boiler, above the plate, for blowing off the foam. The gage-cocks are to be inserted into a pipe, *c*, one end of which enters the steam chamber of the boiler above the plate, *a*, and the other end passes into the water. The inventor advises that a little oil should be occasionally forced into the boiler to cause the water to foam and carry its impurities over upon the upper sides of the plates, to be blown out of the stop-cocks, and thus the collection of scale avoided.



GARDNER'S IMPROVED FOAM COLLECTOR.

The patent for this invention was procured (through the Scientific American Patent Agency) on the 6th of September, 1859; and further information in relation to it may be obtained by addressing the patentee, Thomas G. Gardner, at Elkhart City, Logan county, Ill.

AMERICAN NAVAL ARCHITECTURE.

THE SIDE WHEEL STEAMER "JOHN P. KING."

This beautiful side wheel steamer, just approaching completion, was constructed by Messrs. Westervelt & Son, foot of Houston street, East river, this city. Her owners are Messrs. Spofford & Tileston, this city, and the route of her intended service will be from New York to Charleston, S. C.

We herewith append full and minute particulars of her hull, &c:—Length on deck, from fore part of stem to after part of stern post, above the spar deck, 235 feet; length at load line, 233 feet; breadth of beam at midship section, above the main wales (molded) 36 feet 6 inches; depth of hold 13 feet 5 inches; depth of hold to spar deck, 20 feet 9 inches; draft of water at load line, 12 feet; area of immersed section at above draft, 372 square feet; tunnage, 1,735 tuns.

Her hull is of live oak, white ash, &c., and square fastened with copper, treenails, spikes and other materials. The floors are molded 15 inches, and sided 14 inches. Distance of frames apart at centers, 30 inches; frames are filled in solid.

The *John P. King* is fitted with one vertical beam engine; diameter of cylinder, 71 inches; length of stroke of piston, 12 feet; diameter of water wheels over boards, 28 feet; material of same, iron; dip of wheels 4 feet; length of wheel blades, 10 feet; depth of same, 1 foot 9 inches; number to each wheel, 24. She is also supplied with two return flue boilers, alike in every respect; length of boilers, 26 feet; breadth of same, 12 feet 3 inches; and their hight (exclusive of steam chimney) is 12 feet 3 inches; number of furnaces to each, 5; breadth of these, 3 feet; length of grate bars, 7 feet 3 inches; number of flues above, 18; number of flues below, 15; internal diameter of those above, 8 of 13 inches, 8 of 11 inches, and 2 of 10 inches; internal diameter of those below, 1 foot 3 inches; length of flues above, 19 feet 4 inches; length of those below, 12 feet 6 inches; possesses one smoke pipe, fitted with spring slip joint; diameter of this, 7 feet; and hight above grate surface, 6 feet; boilers located in hold, and have water bottoms; bunkers of iron; boilers have a grate surface equal to 225 square feet, and a heating surface of 5,422 square feet.

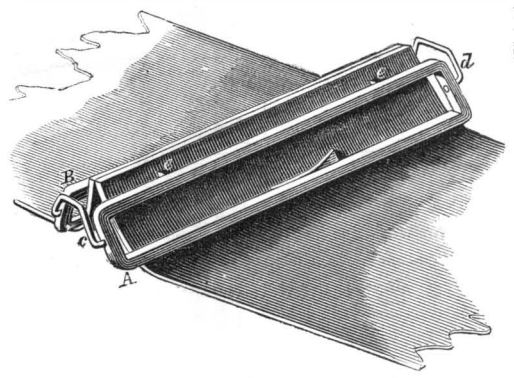
In addition to these features, the vessel is supplied with one independent steam fire and bilge pump, and has the ordinary cocks or valves to all openings in her bottom; ample protection against fire has been made; she has two masts, and is schooner rigged; all her cabins, state rooms, &c., will be fitted up regardless of cost, and we are assured that in this respect, this steamer will not be surpassed by any now running upon our coast.

The machinery of this vessel was constructed by the Allaire Iron Works, this city, and her name is in honor of John P. King, Esq., President of the Georgia Railroad. Captain Richard Adams, formely of the *James Adger*, will command her.

FAIRFAX'S BELT COUPLING.

After all the belt couplings that have been invented, it is surprising to meet with an idea at once so simple and so novel, as has been embodied in the coupling here illustrated.

Two rectangular iron frames, A and B, are pivoted together at their ends by two wires, *c* and *d*, when the ends of the belt to be coupled are introduced between



them in the manner shown in the cut. It will be seen that the parts of the belt are held, not merely by the stout spurs, *e e*, on the frames, but that they are clasped and pressed together by the frames, so that the more strain is placed upon them the more firmly are they held together. The manifest advantages of this coupling are: first, its ease of application; second, not weakening the belt by perforation; third, its durability and consequent cheapness.

The patent for this simple and valuable invention was procured through the Scientific American Patent Agency, on August 21, 1860, and further information in relation to it may be obtained by addressing the inventor, Charles Fairfax, Jr., Cincinnati, Ohio.

To enamel iron articles, clean the surface; put on a composition of ground feldspar, quartz and borax; then fuse in a furnace. Black copal varnish may answer as a coating for cast iron articles that are exposed to water. This varnish must be made with linseed oil and asphaltum.

AGRICULTURE IN THE UNITED STATES.

We glean the following statistical data concerning the United States, its agriculture and manufactures, from a very able article by M. E. Dormoy, in the *Revue Cotemporaine*. In 1783, at the period of the peace, the Unfted States only comprised 802,230 square miles; at the present time they extend over a territory of 2,962,050 square miles, or nearly double the extent of Europe, exclusive of Russia. Out of a population of 3,400,000 males of the age of fifteen and upwards, 45 per cent are agriculturists; while those engaged in commerce, manufactures, trades and mines do not together form more than 30 per cent; 2 per cent are devoted to a seafaring life; while the army scarcely claims one per thousand. These proportions differ widely from those of Europe, since in England not more than 15 per cent are agriculturists; in France, 23 per cent; and in Belgium, 25 per cent. The capital engaged in agriculture amounts in the United States to 5,200 millions of dollars; while that employed in other branches of industry does not exceed 1,000 millions of dollars. Every year agricultnre adds 16,600,000 dollars to the wealth of the country, and in the State of New York alone agriculturists pay four-fifths of the taxes. In 1857, the total exports from the United States amounted to 360,009,000 dollars, of which sum agricultural produce formed two-thirds, including cotton, which alone stood for one-third. In the course of ten years the value of these exports had increased 70 per cent. In the United States the average extent of a farm or estate is from 150 to 200 acres; in France it is not more than 12½ acres; while four millions of small farmer do not own more than from 6¼ to 7½ acres. Maize constitutes the chief staple of the United States, since it occupies nearly one-third of the land under cultivation, or 30 millions of acres; 20 millions of acres more consist of uncultivated pasture land, incapable of producing hay; 12½ millions are meadow-land; oats are grown on 7½ millions of acres, and five millions of acres produce cotton. The vine covers 250,000 acres. The four chief sources of revenue to the Union in the way of annual produce are—maize, producing 300 millions of dollars; hay, 140 millions; wheat, 100 millions; and cotton 80 millions. The number of horses, asses and mules is estimated at five millions, or one of those animals for every five inhabitants; there are 18 millions of oxen, 30 millions of pigs and 20 millions of sheep. The total value of all these domestic animals is about 600 millions of dollars.

EXPERIMENTS AT THE METROPOLITAN MILLS.

MESSRS. EDITORS:—In your paper of the 6th inst., you state that the engines at the Metropolitan Mills yield only about one-seventieth of the power of the fuel. This statement is doubtless based on the tables published in the daily papers of the experiments at 239 Cherry street, some of which gave 14 lbs. per horse power per hour. Since seeing your article I have calculated the consumption at the Metropolitan Mills, during the experiments alluded to, and find that it was less than 4 lbs. per horse power per hour by the indicator. In regard to the strangling of steam, the pressure in the cylinder was within 5 lbs. of the pressure in the boiler.

W. ROWELL.

A PHILOSOPHER TO THE LAST.—M. Retzius, we hear, died in the full pursuit of science. On his dying bed he made his observations on the progressing dissolution of his own body. "The struggle of death is hard," he said to those about him; "but it is of the highest interest to note this wrestle between life and death: now the legs are dead; now the muscles of the bowels cease their function; the last struggle must be heavy, but for all that it is highly interesting." These were his last words.

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INTERESTING CORRESPONDENCE.

WORKING STEAM EXPANSIVELY.

We have never been so much embarrassed with an overflow of valuable correspondence as we have in relation to this subject; and while we were hesitating what to do with it all, we were fortunately relieved from doubt by the receipt of the following communication from the engineer of the hydraulic works of the Illinois and Michigan Canal. As the theoretical question has been pretty fully discussed, and as this communication gives an account of a thorough experiment on a large scale with very marked results, we think that our readers will deem it valuable, and that our ablest correspondents will be willing to give place to it:—

MESSRS. EDITORS:—I promised to send you the results of some experiments I have been making the past summer to test the value of using steam expansively, and now fulfill my promise.

In the first place, let me say that these experiments have been made at the hydraulic works of the Illinois and Michigan Canal at Chicago. They were erected for supplying any deficiency of water in the dryest part of the season that might be needed by the canal, and are capable of raising fifty thousand cubic feet in a minute: the water is taken from an arm of the lake (Michigan), which is always at or very near a uniform hight, except when varied by high winds. It is raised about eight feet by means of two wheels nearly forty feet in diameter, ten feet wide in the clear, and dipping usually between five and six feet, the depth being registered day by day. Upon the outer rims of each wheel are placed cogged segments for driving it by pinions direct on the main shaft.

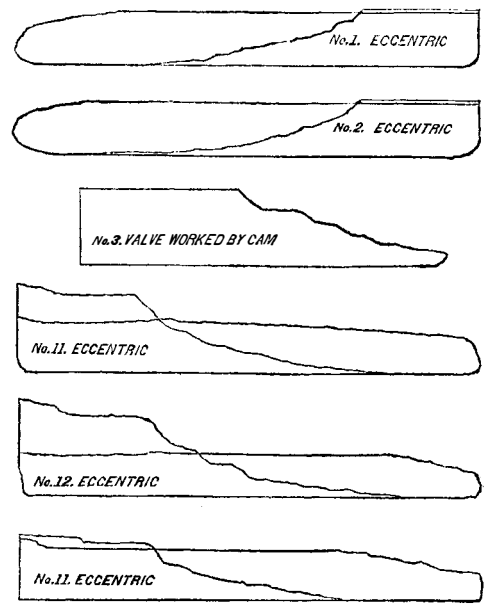
The ordinary duty of each wheel is from fifteen to seventeen thousand cubic feet of water per minute, which falls directly into the canal from the wheel, the hight varying only about six inches as it falls, and is again filled up. The fuel is bituminous Illinois coal taken from the same bed, with not the least discoverable difference in its quality, and always carefully weighed before the firing. There are twelve boilers in nests of six in each, exactly alike, and not one leak in any of them; they are 26 feet long, 42 inches in diameter, with two 16-inch flues in each. They are fired by firemen, employed for the last twelve years, who, we have good reason to know, are capable for their places. The engines work horizontally, are high-pressure non-condensing, the escape steam heating the water for the boilers to very near 210°, which is fed to them as near as may be in a uniform stream. The firemen have a steam gage in plain view, as also have the engineers. The engines are packed with metallic rings, held out by springs in the usual manner. We use puppet valves of the usual Mississippi form, which are in perfect order. They can be worked readily at a full stroke, or cut off at any point below a half, and can be changed to any given point during the progress of the stroke, and without stopping.

We usually carry the steam in the boilers at from 50 to 55 pounds pressure, and cut off at one-fourth of the stroke. One pair of the engines are 6 feet stroke, by 32 inches diameter of cylinder, the valves of these worked by cams. The other pair are 8 feet stroke by 28 inches, worked by eccentrics, and all cut off at the main valve by an arrangement I have never seen before, but working very effectually and certain.

With the great uniformity of the work we have to do from season to season, with so little variation of the water in the lake, and so little in the canal, any carefully made experiment here must give a reliable and truthful result; and especially when frequently repeated as it has been, I cannot see where there is a chance to doubt. The experiments have been made at frequent intervals since May, one day running with cut-off at half stroke, at others down to one-eighth, alternating with full stroke. The experiments continued daily from the 11th to the 27th of August: average about fifteen revolutions of the wheel, with the cut-off at one quarter against eleven with a full stroke; thus—Aug. 11, 10.40 revolutions; 12th, 11.00; 13th, 10.14; 14th, 11.01. Although these experiments were satisfactory enough to me, yet I deemed it proper to make some with special reference to the publication of them in your valuable paper. Accordingly on the 17th of September, every part of the machinery was examined to see that it was in perfect working order. The boilers were cleaned out and filled with clean water. The cylinder heads were taken off at one end, and the steam allowed to drive the piston out to the end, when no leak was found traceable. The valves were all carefully examined, and found in perfect order. The covers to the cylinders were then replaced, and the works set in operation, the firemen knowing nothing of the designs we had in view; they were only instructed to keep the steam as near 52½ pounds pressure as possible, and to keep the coal evenly distributed through the day. The coal was then weighed in half a tun at a time, then allowed to burn out in each experiment until the steam fell to 50 pounds, then the next half tun would be begun upon, and the cut-off changed. This was continued for twelve experiments, and the average result was 1,254 revolutions, with the cut-off at one quarter, and 798 at the full stroke, being a little over 57 per cent gain by the use of the cut-off.

There would be many ways to judge of the reliability of these experiments, if any one were present. For instance, the moment the full stroke was put on, the firemen had to increase their efforts to keep up steam, and this was invariable through all the experiments, the full stroke having the steam low, and the cut-off having it high. In experiment No. 4, one of the firemen went to dinner, and the full stroke run down the steam 20 pounds; the cut-off took it and brought it back, but by doing so fell off say from 115 revolutions for two hundred pounds of coal down to 93, but this was counted as though nothing had occurred.

I send you five diagrams taken along through the trials that any one acquainted may see the condition of valves,



as it was working, I could send you many more, but this perhaps is more than is neeessary. It has been our aim to take cards from the engines daily, and lay them away for future reference.

Thinking that even these experiments might not prove entirely satisfactory to the advocates of non-expansion, I yesterday went over with as many as I could during the day, with different firemen selected, so that they could not know what were our designs. The diagrams, 11, 12 and 11 were taken yesterday, No. 1 aad 2 taken the 17th. No. 3 is from the cam engine, merely to show the state of that engine; we have not been obliged to run more than one wheel, and this has lain still.

The result of yesterday's experiments are 108 revolutions with the cut-off, and 73 with full stroke. The water in the river steady at 5 feet 3 inches; in the canal 6 feet 4 inches raised to 7 feet, which is the highest point we pump. I would remark that every part of the machinery was oiled once during each experiment; the temperature of the water for the boilers varying but little during the day. I have already drawn out these papers too long, but before closing I would be glad to say it is our purpose to use higher steam, say 100 pounds, and cut shorter, but the blow from steam higher than 50 pounds on the cut-off is unpleasant. This will, in another season, be corrected, and no doubt we shall cut at one-eighth.

A. GUTHRIE.

Chicago, Ill., Oct. 4, 1860.

A DECISIVE EXPERIMENT IN FAVOR OF EXPANSION.

MESSRS. EDITORS:—The subject of working steam expansively being the order of the day, we will give you the results of some experiments made at the Tivoli Railroad Mills, of Henry Lansing & Co., of this place. Having noticed in your valuable paper the result of the experiments at the Metropolitan Mills, we thought it to our interest to ascertain whether they were correct or not; for if they were, we had been laboring to a great disadvantage. We have an excellent opportunity for testing the matter, as our work is regular at all times. We have in use one engine of 18-inch bore, by 36-inch stroke, built by Franklin Townsend, of this place, under the superintendence of the able and efficient mechanical engineer, George P. Jackson, Esq., fitted with Burnap's patent variable cut-off valve (but no throttle valve), which consists of a cut-off valve, sliding on the back of the main valve in a steam-tight box or chamber, having no pressure of steam at all, and being varied by the governor to cut off at any point desired. The cylinder is lagged and covered to guard against condensation, and the piston is fitted with Jas. O. Haight's patent Z packing-spring, effecting a great reduction of friction; in short, it is constructed with every desirable improvement for working steam expansively. It runs 50 revolutions per minute, cutting-off at ¼ stroke, drives three runs of stones and all the other machinery connected with a first class flouring mill.

We ran one day with our usual head of steam 45 pounds, and cut-off at 9 inches, weighing the coal. The next day we carried a lower head of steam, and cut-off at 18 inches, or half-stroke, when we found that we consumed one-third less fuel the first day at short stroke than on the second on the long stroke. As we ran the same number of hours, and the labor performed was exactly the same, the stones being in the same condition both days, and the amount of flour the same, with a small amount in favor of the short cut-off, we came to the conclusion that we derived a decided benefit from the expansion. But in order to thoroughly test the matter, we tried it for several days in succession, cutting off at 9 inches one day, and 18 the next, to be certain that no difference in the atmosphere could effect the consumption of the fuel, and invariably found a gain of one-third the amount used in favor of the short cut-off system. We also found much more difficulty in keeping the low head of steam with the long cut-off. One day when we could not keep the requisite amount, we stopped until we got the steam up to 45 pounds, and then cutting off at 9 inches we had no trouble. This, we think, is another argument in favor of expansion. We also tried one other experiment, which was to carry a greater quantity of steam than was required, and throttled it in the pipes, wire-drawing it into the steam chest, and found this made a material difference, using considerable more fuel than when giving it free passage. As the result of our trials have been perfectly satisfactory to us, we have continued our former plan of working steam expansively, and have arrived at the conclusion, that there cannot fail to be a decided gain by it when the engine is so constructed as that the full pressure of steam in the boiler is conveyed directly to the piston, without throttling or strangling in the pipe or ports.

S. M. SHEPARD, Superintendent.
C. W. ROSE, Engineer.

Albany, N. Y., October 4, 1860.

NIGHT AIR.

MESSRS. EDITORS:—It has been lately discovered—as we must infer from various paragraphs just now circulating in the papers—that we are very foolish in excluding night air from our chambers. Air—air, it is contended, why should the air of the night be less salubrious than the air of the day? Why should the air which the "songster of the forest" breathes in his nest at night, be injurious to man (in his bed)? &c., &c.

Well, is it not strange that in looking at one point, the *salubrity* of the air, people can overlook the surrounding circumstances or conditions! We might just as well propose that a cold bath is harmless at any time or condition of the body, because water is the most salutary of all the liquids.

It seems as if those "lovers of night air" forget that,

1st. We are *undressed* at night (not wholly so, its true), though more or less under quilts, &c.

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2d. That we lie wholly *inactive*, except breathing, perspiring, and, perhaps, kicking away the covering!

3d. That there is a difference in climates; that the night air of the eastern coast of America is not the night air of Venice, of Constantinople, of the Society Islands, or even of London!

4th. That the frequent change of the temperature in the night would, even if taking place during the day, be perceptibly felt by every one in full dress and activity.

We might enlarge on these points, but will rest here and leave it to our night air friends to upset our opinion.

In conclusion, we only beg to express our humble advice to those readers who, on one side, have no ventilated apartments, and, on the other, are not obliged to sleep in a room overcrowded with company, and we feel pretty sure in the safety of our advice:—Open your chamber windows after you are dressed in the morning, and shut them down just before you undress for the night, and then go to bed perfectly satisfied that your health is safe with regard to AIR.

Portsmouth, N. H., September, 1860.

[After the sun has set at night, and before it rises in the morning, all air is night air. The question is whether it is best to breathe that which is out of doors or that which we have shut up in our rooms during the day. In the first place, it is to be remarked that exposure of the unprotected body to the cold is injurious, and may very well counteract a portion or even the whole of the good effects of breathing fresh air. But if the system is properly protected from the cold, we have no doubt that a slow change of the air in our rooms, at night, is beneficial. Air that comes from the lungs is deprived of a considerable portion of its oxygen, and is charged with an extra supply of carbonic acid, which is a deadly poison to everything that breathes the breath of life. Besides this poison, the air from the lungs is full of waste animal matter, which, in densely crowded apartments, collects in such quantities on the walls that it has been scraped off and subjected to a series of experiments. For our own part, when we have breathed a pint of air once, we do not want to draw it into our lungs again until it has been out into the laboratory of nature, and been purified by having its dirty animal matter washed out of it, and its poisonous carbonic acid diffused abroad through the whole ocean of the atmosphere. The world-renowned Dr. Beaumont says: "No matter how bad the air is out of doors, it is always worse in the house."—EDS.

ENTHUSIASTICALLY COMPLIMENTARY.

The annexed letters we select for publication from a number received in two days, last week. They indicate the sentiment of nearly every inventor who has had patent business prosecuted through the Scientific American Patent Agency:—

MESSRS. EDITORS:—A conviction of duty and obligation has been burdening me for some time, in reference to an acknowledgment I deem justly due to the great "American Patent Agency," for the prompt and efficient service rendered in making out specifications, the beautiful drawings of models, and the obtaining numerous patents within two years past, without a *single failure*. I once thought I could make out my own specifications and drawings, but I am thoroughly convinced it would have been greatly to my disadvantage, had I attempted it. I have often been delighted when a specification has been sent to me for my signature, to discover the tact, skill and talent displayed in the choice of words, and of the phraseology used in describing and making perfectly clear the novel features and new points desired to be brought out. In one or two instances there were important points made clear, that I had not discovered myself in my own model.

I take pleasure, yea, pride in affirming my conviction that the great American Patent Agency, and SCIENTIFIC AMERICAN, combined, are wholesale benefactors of this entire country, and of *inventors in particular*. The Scripture affirmation is that the truly benevolent or christian man "seeks his neighbor's wealth." There is a justifiable pleasure and pride in doing good to others, in lightening the burdens of this life, and causing prosperity and good cheer to spring up almost unexpectedly in thousands of widely separated families. The golden sands of useful truths and of scientific facts come tumbling along every week from the SCIENTIFIC AMERICAN into our families, to such an extent and of such a character that I often regret that every progressive family (or susceptible of being made progressive) could not be furnished with the perusal of its luminous pages. The sentiment advanced in one of the back numbers of your journal, that "the greatest discoveries have been made in leaving the beaten tracks of science and going into the by-paths," struck me as a useful fact, and is "an apple of gold in a picture of silver." I wish to say further, as facts are what we have to do with to a great extent, that moderate prices and *fair dealing* have characterized all my transactions with the Scientific American Patent Agency.

I am in the receipt, this day, of your note informing me that my patent is ordered to be issued. This is the more gratifying as I have this day made a successful trial of the horse rake; it works to a charm. From 6 to 12 pounds is all the power necessary to be applied with the foot. A boy 12 years old can work it with ease. Please accept my thanks for your numerous favors:

J. C. STODDARD.

Worcester, Mass., Sept. 5, 1860.

MESSRS. EDITORS:—Allow me to thank you for the assistance you have rendered Mr. Littlepage and myself by inserting in your columns the article in regard to the tests of water wheels. We regard it as another evidence—

1st. Of your aim to publish correct data only, and to lay doubtful information, from whatsoever source, open to correction; truth suffering nothing from investigation and discussion.

2d. That you will extend even justice to all, though unknown and from "Texas."

You can hardly be aware how cheering it is to a poor inventor, accustomed to meet with a doubtful shrug of the shoulder in the way of assistance, to find that with MUNN & Co., at least, he stands on the same footing with a "nabob," and will find such protection as even-handed justice would dictate and the pubilc interest will allow.

Many a struggling inventor would gather strength from this knowledge, to overcome the many difficulties he encounters in mounting the first round of the ladder of success.

To this I would add my feeble testimony in stating that inventors need not fear of being led on or encouraged by your establishment to spending their money in the pursuit of inventions such as, in your opinion, would not remunerate the applicant. At least several of mine, of doubtful nature, have been returned to me with the advice to experiment with them, simplify them, and to test them as to their value and usefulness, &c.

When it is remembered that an inventor is generally slow—very slow—in discovering the defects of his own productions, such disinterested advice cannot be too highly appreciated, although it may tear down "castles built in the air," and thereby prevent *greater* disappointments and loss of money. ROBERT CREUZBAUR.

Austin City, Texas, Sept. 5, 1860.

MESSRS. MUNN & Co.—I am happy to inform you that my Letters Patent have just been received from Washington, for my improved buggy plow; and you will please accept my sincere thanks for the very prompt and efficient manner in which you conducted my case at the Patent Office. I would further say, that you have secured all my business at the Patent Office for the future, and that of all my friends, as long as you conduct business as satisfactorily as in the present case.

EDWIN J. FRASER.

Kansas City, Mo., Oct. 4, 1860.

MESSRS. MUNN & Co.—We have received our Letters Patent from Washington. Just one month from the time we acknowledged our papers and forwarded them to you, we were in receipt of our patent deeds. This, as well as other business we have had with you, was promptly attended to, and increases our confidence in your agency, so that we shall endeavor to increase your list of clients, and engage your able counsel in all cases of the same kind we may have hereafter. For your energy and prompt attention to our case, you will please accept our most sincere thanks.

G. W. & J. J. KERSEY.

Beartown, Pa., Oct. 5, 1860.

A COLUMN OF VARIETIES.

The special correspondent of the London *Times* gives an amusing account of the attempts of the Chinese to work the engines ot the *Cormorant*, the British vessel sunk last year in the Pei-ho. The Chinese, it seems, succeeded in raising the sunken vessel. They then built a boat, into which they transferred the *Cormorant's* engines. But alas! they would not work, and no one could set them going. So Sang-holin-sin sent down four watchmakers from Pekin. "You are accustomed to machines," said he; "set that barbarian machine to work or I will cut off your heads." The unhappy watchmakers succeded in lighting the fires and inducing the smoke to ascend through the funnel. This seems to have contented their taskmaster, for, though the engines are not working, we have no account of the watchmakers decapitation.

In 1842 an Irish boy by the name of John Kelley, living at Chatham Four Corners, in this State, received a gun shot wound in the shoulder, and the surgeon who dressed the wound, though he felt the ball with his probe did not deem it prudent to remove it. On the 15th of June last, the boy, (of course become a middle aged man), died in Clinton county, and on the post mortem examination the ball was found embedded in his heart where it had been carried 18 years.

Professor Newton of Yale College, has a long article in *Silliman's Journal*, on the great meteor which flashed over this city on the 15th of last November. From a comparison of all the testimony, he comes to the conclusion that its velocity must have been greater than 21 miles in a second, from which it would follow that the body could not have been a little moon revolving around our earth, nor even a planet revolving around the sun, but that it must have come from the depths of space beyond the boundaries of the solar system.

A series of investigations extending through the last 20 years, and conducted in the most careful manner, by the ablest physiologists of France, Germany, England and America, have demonstrated that the liver of man, as well as that of most other animals, secretes sugar from substances brought to it by the blood, and it is found that the liver continues to produce sugar some 24 hours after death; even when the organ is removed from the system.

It is found that for persons to acquire the wonderful dexterity exhibited by our telegraph operators, it is necessary that they should begin to learn the art while they are young. Dispatches are transmitted about as fast as a man can write, and the operator reads them by listening to the clicking of the instrument, writing the words down as they are received. Reading by the ear is found to engender fewer mistakes than the old recording process.

On the 17th of July, a great meteor fell in India. It is described in a letter to the English papers as having produced a noise as if all the artillery in India had been discharged at once, and the writer says that he actually thought the mountains were falling down. He saw a piece fall, and sent some Sepoys to dig it up. They found it buried three and-a-half feet in the ground, and so intensely cold that they could not bear their hands on it.

A man in Iowa, not far from Mercer county, Missouri, being annoyed very much with persons stealing watermelons, put poison in some of them. Five men who went into the enclosure, got hold of some of these poisonous melons, ate three of them, and three of the party were found dead in the enclosure, and two just outside.

Howe's standard scales at the State Fair in Maine, weighed 3,820 persons, the women averaging 126 pounds 5 ounces, and the men 152 pounds. This shows the women of Maine to weigh 9 pounds 7 ounces, and the men 5 pounds 3 ounces more than in Massachusetts, by the specimens weighed in the Mechanics' Fair.

Sulphurous acid, though extremely volatile, will not evaporate in a platina crucible previously heated red hot. If, however, a few drops of water are thrown in the mixture is brought into intimate contact with the sides of the vessel, and such is the energy of the evaporation of the acid and its absorption of all the heat of the water, that the latter will not only be left behind but perfectly frozen in the red hot crucible, from which it may be thrown out as a button of ice.

The richest man in Great Britain is the Marquis Westminster, whose annual income is about $7,000,0

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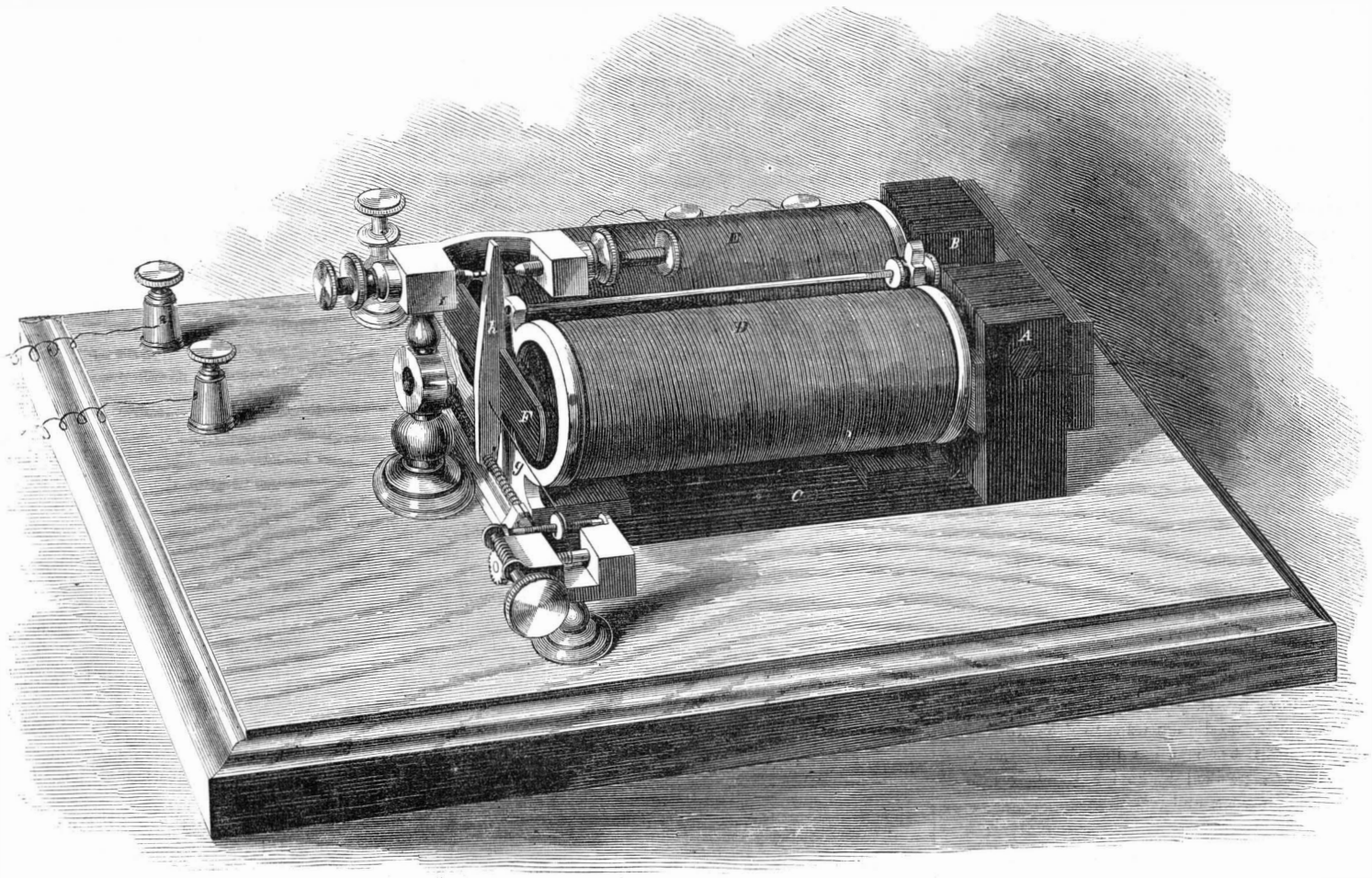
IMPROVEMENT IN ELECTRO-MAGNETS.

The practical working of the electric telegraph has caused a very wide diffusion of a knowledge of electricity and magnetism among our people, and the hope of making valuable inventions in this department of the arts has led to an intense study of the various phenomena of these forces. We have already described a number of inventions in telegraphing, and the field seems to be just fairly opening before our inventors. The invention which we here illustrate does not relate to the details of telegraphing, but is an improvement in the electro-magnet for whatever purpose used.

matter may be obtained by addressing the inventor, Alfred G. Holcomb, of this city.

Mr. Holcomb informs us that, to measure the increase of attractive power produced in the soft iron cores of the helices, by the combination of the steel magnet and the battery, he arranged a delicate lever, like a steel-yard, to draw away the armature from the ends of the cores by means of a weight, and obtained the following very singular results; showing that the power of the cores under the combined action of the battery and permanent magnet was greater than the sum of its powers under the influence of the two separate. In the table



HOLCOMB'S IMPROVEMENTS IN ELECTRO-MAGNETS.

A permanent steel magnet, C, has connected with its two poles, A and B, the soft iron cores of two helices, D and E. In front of the poles of these cores is placed the armature, F, to which is attached the straight steel wire, *g*, operating as a spring by being drawn a little from a straight line between the two points to which the ends are fastened.

Supposing the magnet is to be used as a relay magnet in telegraphing, the spring is so strained that it will just balance the power induced in the cores by the permanent magnet, in which case, the platinum point at the end of the lever, *h*, to which the armature is attached, will be neither fully in contact with the corresponding point on the standard, I, nor yet so far removed from it as to entirely break the local circuit. Now if the electricity be so passed through the helices, D and E, as to add its force to the influence of the permanent magnet, the magnetism of the cores will be so increased that they will draw the armature forward, thus completely and certainly breaking the local circuit. Then if the current be reversed, so as to counteract the influence of the permanent magnet on the soft iron cores, the power of the spring will draw back the armature, effectually closing the local circuit. It will be seen that this arrangement permits the employment of a spring twice as powerful as if no permanent magnet were used, or it enables a spring of given power to operate with a current of half the force.

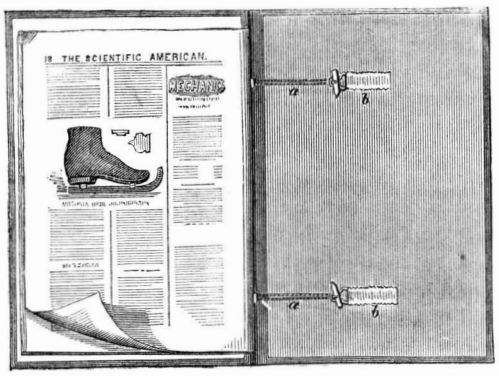
The inventor says this magnet has been thoroughly tested for telegraphing, and found practicable, and that it can be easily applied to every kind of telegraph instruments.

A patent for this invention was granted on the 15th of May, 1860, and further information in relation to the

below, the first column shows the power of the cores when subjected to the battery alone with currents of varying force; the second colnmn its constant power under the influence of the steel magnet alone; the third column, the power when both were combined, and the fourth column the differences between the third and the sum of the first two. The close relation between the first and the fourth is very curious. The numbers are units of the weight used:

Battery power.	Power from steel magnet.	Power from both combined.	Excess of combined power over both separate.
5	20	30	05
7	20	34	07
10	20	39	09
17	20	52	15
20	20	58	18
24	20	62	18

JACOBS' PORTFOLIO PAPER FILE.



Several months since we bought one of the files here illustrated, and we would not sell it (if we could not get another) for several times its cost. By its means, we are enabled to keep a file of the current volume of our paper in just as neat and convenient form as if it were bound. It is only necessary to make the article known to cause it to be generally adopted by people who wish to preserve files of valuable papers and to have them always ready for reference.

A portfolio is made of two stiff leaves, connected by a back of cloth, leather or other pliable substance. To the inside of one of the leaves are fastened two cords, *a a* (see cut prefixed), with metallic needles secured by the middle at their ends. On the inside of the opposite leaf are fastened at one end the elastic bands, *b b*, with eyes at their free ends for the passage of the needles. On the inner edge of the latter-named leaf, are two eyes for the passage of the cords, *a a*. The newspaper being placed in the portfolio in the position shown, the needles are pushed through it near the fold, and are then passed through the eyes in the edge of the leaf and the eyes on the free ends of the bands, *b b*; these bands being forcibly drawn forward for the purpose.

By this arrangement, the newspaper is not only held in a perfectly protected and safe position, free from creases in its pages resulting from folds, but it is in a far more convenient form for handling than is obtained by any other mode of filing known to us.

The patent for this invention was procured (through the Scientific American Patent Agency) on the 15th of June, 1860; and further information in relation to it may be obtained by addressing the inventor and manufacturer, J. Nelson Jacobs, at Worcester, Mass., or Lyman Drury, at the *Century* office, No. 37 Park-row, New York.

KEEPING HORSES' FEET AND LEGS IN ORDER.—If I were asked to account for my horses' legs and feet being in better order than those of my neighbor, I should attribute it to the four following circumstances: First, that they are all shod with few nails, so placed in the shoe as to permit the foot to expand every time they move; second, that they all live in boxes instead of stalls, and can move whenever they please; third, that they have two hours daily walking exercise when they are not at work; and fourth, that I have not a head-stall or track-chain in my stall. These four circumstances comprehend the whole mystery of keeping horses' legs fine, and their feet in sound working condition up to a good old age.—*Miles.*

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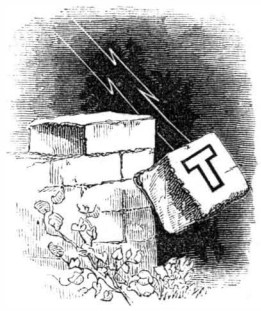
VOL. III., No. 17....[NEW SERIES.]....*Sixteenth Year.*

NEW YORK, SATURDAY, OCTOBER 20, 1860.

ARE GRAVITY AND ELECTRICITY THE SAME THING?



THERE is no question occupying more attention among the highest order of intellects than the question of the identity of the several invisible forces of nature. The relations of magnetism, electricity, chemical affinity, heat and light, are certainly very close and very complicated. Each one of these forces is capable of producing either or all of the others. They may also all generate mechanical power, and mechanical power, on the other hand, may generate all of these forces. Perhaps as good an illustration of this as any is to be found in the electric light invented by Professor Way, of London, which we described last week. First, the mechanical power of a *steam engine* turns a wheel which carries a number of permanent *magnets* at its periphery; these magnets, as they are carried past the ends of soft iron cores which have insulated wires wound around them in helical form, cause waves of *electricity* to flash through the helical wires. the electricity, darting along from drop to drop of an exceedingly slender stream of flowing mercury, produces an intense *light*; it also generates *heat*, by which the mercury is evaporated. But whence comes the mechanical power of the steam engine? That results from the expansion of steam caused by heat, and the heat is produced by the combustion of fuel, which is its chemical combination with oxygen; in other words, *chemical affinity*.

If we replace the steam engine by a water wheel, we have the several forces produced by *gravitation*. It is to be remarked, however, that gravitation cannot be generated, in its turn, by any of the other natural forces or by mechanical power.

It is known that sound is simply motion of the particles of the air. The vibratory theory supposes that light, also, is nothing but the vibration of the particles of a very subtle ether pervading all space. This theory is now almost—if not quite—universally adopted, and is regarded by many sound minds as absolutely demonstrated. There is also a plausible theory of heat which regards it as simply vibratory motions in a subtle ether or in the particles of the heated body. Iron may be heated red hot by simply pounding it. As the heat will generate motion, so the destruction of motion will generate heat. It is thought that one cause of the sudden heating of meteoric stones, as they pass through our atmosphere, is the destruction of a portion of their motion by the resistance of the air. Professor Newton, in his article in the last number of *Sillimans' Journal*, on the great meteor of Nov. 15, 1859, goes into a calculation of the amount of heat that would be imparted to the meteor by the destruction of its velocity, and finds it sufficient to evaporate iron or any other known substance.

From these several facts, and others of the same kind—enough to fill volumes—the grand and simple idea has been suggested, that all the forces in nature are the same thing; merely *matter* in *motion*. This suggestion implies that all the countless phenomena of chemical combination—all the appearances produced by light, its endless variety of color and shade, its refractions, reflections and polarizations, with the miraculous revelations which these have given us through the telescope and the microscope—the tremendous power of heat, with its contractions, expansions, freezings and evaporations—all the swift and subtle operations of electricity in the galvanic battery, the lightning rod and the telegraph, and, finally, the growth and decay of plants and animals, the action of the muscles, the stomach, the lungs, the nerves; in short, all the phenomena of the universe—are produced merely by changes in either the velocity or the direction of the motions of matter.

Such is the doctrine of the homogenesis of forces. A sublime and comprehensive theory, whether true or false! A few pretty capable men have committed themselves to it fully; but most able philosophers regard it as unproved, though it seems to us that there is a general leaning towards it—a prevalent feeling that it will turn out to be true. As the relations of the natural forces to each other caused the conception of the theory, so the promulgation of the theory has led to a very close study of these relations; and the field is as rich in curious and wonderful facts as any that has ever been explored by the student of Nature.

A GREAT FIELD FOR CHEMICAL INVENTIONS.

Less than five per cent of all the patents issued are for chemical inventions. The first impression which this fact leaves is that the chemists are not so wide awake as the mechanics. And it seems, too, as if the chemists have the best chance, for they have the range of all the combinations, almost infinite in number, of all the sixty or more, simple substances or elements, while the mechanic is limited in all his inventions to the use of only five mechanical elements. But this course of reasoning is a little unfair for the chemist, i we wish to determine his real merit as a benefactor of mankind.

If a mechanic is making an invention, he has a definite object in view; he knows also precisely the effect of any combination he may make of the resources he has at hand. A skillful mechanical inventor may fully complete his invention in his head, and a few calculations and drawings on paper may accurately represent and demonstrate it to others of equal intelligence. An intelligent mechanic often needs only to be told the new thing to be accomplished, and the means suggest themselves spontaneously; the thonght is father of the dee .d The search of inventors is rather of things to be done than how to do them.

But great chemical inventions are made in quite a different way. The chemist has not such certain data for reasoning as the mechanic; he cannot predict the effect of new combinations; if he have an end in view, the way to reach it is not so apparent. The chemist, before trying the experiment, might suspect that chlorine and sodium would unite with each other, bnt he could not, by any process of reasoning, be able to say that the compound would have the properties of common salt: if it were proposed, as a problem, to produce salt, no chemist by reasoning alone wonld attempt to solve it, and an attempt to solve it by empirical trials would be quixotic.

It is easy enough to make new combinations of matter, bnt it is not so easy to find a use for them. New chemical preparations increase at a rate which is almost bewildering to ordinary people; the mere names of definite compounds which have been discovered in the present century would fill a whole volume of the SCIENTIFIC AMERICAN. The chemists who make these new substances are generally men who labor for fame, or from an irrepressible love of their science, which is akin to the enthusiasm of the naturalist. Their laboratories are a manufactory and a museum of scientific curiosities, made and labeled only to be looked at and admired. The men who find usefulness in these inventions are quite a different class, for they are matter of fact men who care about nothing which does not contribute to our well being; and it is the discoverer of the utility, quite as much as the original inventor of the process, who confers the substantial benefit on mankind and reaps the reward of money. We all respect science for its intrinsic worth, but it is only practical and useful results of science which the people care about seriously. Let abstract science be measured by fame and honor, and applied science by money.

We have introduced these speculations chiefly in order to suggest to practical men that, among the myriad of chemical substances for which no use is yet known, they will find very promising opportunities for the exercise of their peculiar sagacity. Thus far, the introduction of new substances has been too slow and too much the result of chance. Illuminating gas was known as a chemical product for centuries before any use of it was made; iodine, bromine, chloroform, aniline, and a hundred other things, now common, were for a very long time only rare specimens on the shelves of the chemist's curiosity shop, before they were found to be of the greatest value to men, and we cannot have a doubt that much more of the same kind of wealth is soon to be developed. May we not reasonably expect that virtues may be discovered in things now neglected, which will directly lead to the invention of arts more wonderful and more useful than photography or electro-telegraphing?

GREAT TRIALS OF MOWING AND REAPING MACHINES IN FRANCE.

Two great trials of these important implements have been made in France this summer; a trial of mowing machines on the imperial farm of Vincennes on the 18th, 19th, 20th and 21st of June, and a trial of reaping machines on the imperial domain of Fouilleuse on the 31st of July and the 1st and 2d of August. We think our readers will be interested in the following extracts from the reports of the juries in the two cases, which we translate from *L'Invention*. The jury appointed to decide on the mowing machine essays say:—

"The following table presents the results in the cases of all the machines exhibited which were able to accomplish their tasks:—

FRENCH MACHINES.

Names of the inventors.	Number of horses attached.	Number of men employed to each machine	Time employed for cutting 20 ares — minutes.	Quality of the work.
Mazier	1	2	57	Good.
Legendre	2	2	40	Pretty good.
Roberts	2	1	26	Passable.
Lallier	2	2	50	Ordinary.

FOREIGN MACHINES.

Names of the inventors.	Names of the constructors.	Names of the exhibitors.	Number of horses attached.	Number of men employed to each machine	Time employed to cut 20 ares — minutes.	Quality of the work.
Wood	Cranston	Peltier	1	1	31	Excellent
Wood	Cranston	Claudon	1	2	32	Very good
Wood	Cranston	Claudon	2	1	30	Very good
Allen	Burgess	Burgess	2	1	29	Perfect
Allen	Burgess	Piednue	2	1	20	Excellent
Allen	Laurent	Laurent	2	1	30	Good
Brigham & Richerton	The same	The same	2	1	22	Pretty good

"In order that the essays at Vincennes should be complete, the jury determined to multiply the experiments. They also caused the machines to operate in the rain, and on parts of the meadow in which the grass was badly lodged. Several machines have triumphed over all the obstacles, and have given the most satisfactory results; so that it was manifest that the prizes proposed by government were very justly won, and the only doubt that arose was in reference to the machine to which the prize of honor should be awarded.

"Although the mechanical mowers have operated only drawn by horses, and although they have been constructed up to the present time for regulating the quickness of the motions of the scythe only by the pace of the horse, there appears to be no doubt that, by simply modifying the gearing, the constructors will be able to make the machines proper to be operated by oxen.

* * * * * * *

"The machines which have incontestibly operated the best are those of the American systems of Wood and of Allen. The jury have placed in the first line the system of Wood, and in the second line the one of Allen. They have put in the third rank the machine of Messrs. Brigham & Richerton. The machine invented by Mr. Wood at Hoosic Falls, N. Y., is remarkable for its small dimensions, for the facility with which the scythe is dismounted, and for the narrowness of the track in which it can pass; requiring scarcely a wider road than a horse. Its price is only 500 to 600 francs, and it can, without doubt, be reduced to 400 francs. But what distinguishes it above all is the very ingenious disposition of its parts.

* * * * * * *

"The jury have deemed it their duty to decree the

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first prize for foreign machines—consisting of a medal of gold and 1,000 francs—to the machine of the American system of Wood, exhibited and brought to perfection for transportation on roads by Mr. Peltier, Jr., living at Paris, No. 45 Rue Marais-Saint-Martin. The prize of honor—consisting of a large medal of gold—has been also awarded to the same machine, the best of the international meeting. A medal of gold has been demanded of the Minister of Agriculture for Messrs. Claudon & Co., of Clermont (Oise), second importers of the Wood machine.

"The jury also believe it a duty to make known that the machine of Wood has not been patented in France; that the construction of this machine belongs to the public domain, and that our constructors will be able to imitate and perfect it."

REAPING MACHINE TRIAL.

Foreign Machines.—"In the first line is placed the machine of Burgess & Key; the jury have decreed to it the first prize and the prize of honor. It is known that this machine is none other than the American machine invented by McCormick. It has been improved by Messrs. Burgess & Key, who have added to it three helices, ingeniously disposed to gather the cut grain and throw it on the soil in parallel swathes in the track passed over by the horses. This operation is effected perfectly when the machine cuts barley properly ripe and dry. Only a small number of these machines have come into France; but Mr. Laurent, of Paris, who has bought of Messrs. Burgess & Key the right of manufacturing them, has delivered 150 to our agriculturists, of which three were for Algeria.

"The machine exhibited by Mr. Cuthbert is a happy improvement on the American system of Hussey, and although of a moderate price, is one of the best constructed reapers which have appeared at the concourse of Fouilleuse. It has merited to this exhibitor the second prize for foreign machines.

"The machine invented and constructed by Mr. Wood, of the United States, has been imported into Europe by Mr. Cranston, who charged himself with operating it before the jury. It has experienced some modifications since the exhibition of last year. The jury have decreed to Mr. Cranston the third prize for foreign machines."

The jury also make honorable mention of the Manny reaper, imported by Roberts, and of the celebrated Bell machine, which, they say, was the first mechanical reaper that ever actually operated; having been in use in Scotland since 1828. It is pushed before the horses.

French Machines.—"Dr. Mazier remains at the head of French inventors. He does not cease to make improvements in his machines, which are more simple and less cumbersome than the foreign reapers, and are, therefore, better adapted to the general conditions of French agriculture. He has lowered the price of his machines from 1,050 to 800 francs, and has delivered 90 to French agriculturists. Mr. Mazier declared to the jury, with great loyalty, that he owed part of his success to the persevering aid which he has received from his foreman, Mr. Emile Ruffrey. The agriculturists are happy to find occasions to encourage the workman employed in developing their industry. They know well the master is obliged to count on the laborer. It is by benefits on the part of the chief that are maintained those long attachments so frequent now between the masters and the rural agents. The jury have sympathized with the sentiment which actuated Mr. Mazier in his declaration, and have demanded of the minister a bronze medal and 200 francs for Mr. Emile Ruffrey. They are happy to recompense a worthy co-operator in the invention of French mowing machines."

THE STEAM PLOW—FAWKES' AND OTHERS.

We find the following reflections on the steam plow in the New York *World*. We see that this important matter continues to attract a great deal of attention in England:—

A year ago, at some of the large agricultural exhibitions, particularly at the National, held in Chicago, a demonstration was had on this new invention, to test its applicability, as an actual plow, in superseding, by the use of steam and machinery, the ordinary plow now used in cultivation. The trial was not conclusive—not satisfactory even to the committees appointed to try the machine, although the large premium offered for a successful one of the kind was claimed by the inventor. There were defects in its principle, and still greater defects in its mechanism. These were all to be remedied and overcome. So said the inventor. It has been again tried this Fall at the late Illinois State Fair, at Jacksonville, but with no better success, as we learn, than before. What the alleged impediments to success may be, we do not know; we do not much care, even; for a steam plow, or a machine to drag behind, or drive before it a gang, be it three, five, or ten veritable plows, of the shape and kind now used on our farms, we believe will prove no achievement, either in economy or expense, or excellence of work, over that which it is intended to supersede.

The expression of such opinion may be thought the very essence of "fogyism" in this day of invention and improvement. Yet, we so believe. It will take too many words to give all the reasons for our belief, but a few we will name, even admitting the thing to finally prove successful:—

1. The expense of the machine will exclude it from all small farms, and gardener's uses, in the contracted area of their premises.

2. Its size and cumbrous working will require fields of great size, and a long stretch of "lands" to range upon, without frequent turnings. The soil, too must be of a level surface, or, if undulating at all, in such regular undulations that the "dip" and positions of the several plows composing the "gang" can be uniform.

3. Leaving out several other objections, the fatal one exists, that the plow itself, as now constructed—no matter how good it be—is an imperfect implement, founded on a false principle for the perfect breaking up and movement of the soil, and fitting it to receive the seed for a crop. Such being the fact, as we assume it, the "plow" is not worth the pains of applying it to steam use, and the same skill and invention had better be applied to some other kind of machine.

Why is the plow imperfect? Simply, for the reason that soil, to be perfectly prepared to receive the seed and produce a crop, should be thoroughly pulverized, deeply dug, and rest on a soft bottom underneath, which last, though not penetrated by the instrument which has worked above it, shall still admit the roots of whatever grows above to enter and run down, if they choose to do so, and draw whatever nutriment they can from below. In short, if land is plowed six, eight or ten inches deep, and its upper strata be lifted and turned over to either of those depths, the lever power which raised it is exerted to the same extent to press down still more compactly than before the soil beneath it. That is, the plow, in its work, presses both ways—down as well as up; whereas, the work, for the benefit of cultivation, should be lifting only. The pressure down is all wrong, and, so far, does a positive injury to the sub-soil, let the comminution of that above be ever so perfect. In light soils, we admit that the downward pressure is not always prejudicial to the future crop. But in clay, or heavy soils, it must be so. The sub-soil surface of the furrow below is as polished, from the pressure of the bottom of the plow upon it, as the top of the inverted earth which is lifted from it, and turned over into the adjoining furrow; so, unless the roots of the growing crop be very strong, they must seek their food only near the surface, or within such depths as the plow may have penetrated, and thus be liable to be cut short by drouth. For perfect cultivation, these difficulties must be obviated.

Well; and how? By the invention of a rotary digger. That is to say, a cylinder revolving a shaft supported at each end on a frame, on the principle of a common form or garden roller; that cylinder to be filled with spiked or claw-formed teeth; and, by its rapid revolutions, these teeth must dig up the ground, six to twenty inches deep, as may be desirable, leaving the ground light, free, and thoroughly pulverized, to receive the seed of whatever kind. A drill may be attached behind it, for the purpose of sowing or planting the seeds, if necessary. This, in short, is the grand desideratum which we look for in the perfect cultivation of the soil. The earth, by this operation, will be loosened as far down as the machine goes, and the sub-soil, beneath what is loosened, will not be packed still harder than it laid before, as with the plow. It will be readily seen that, in this proposition, the plow is superseded entirely, as it should be in all free soils, and an instrument of altogether another kind has to take its place.

Now, can this implement be invented and perfected for practical and easy operation? We think so. It need be no more complicated than a reaper or a mowing machine. It may be made to work by either horse or steam power; and, without divulging a secret, we are of opinion that there is now in progress, in western New York, a machine possessing the right principle of a rotary digger, and that it will soon be in operation. That it will be perfect in its first movements we do not say, but we believe that a practical machine of the kind will, in due time, be accomplished.

Can the small farmer use such a machine economically, even it be invented and perfected? We believe so, if his land be free from stones and roots. Its portability and compactness will render it easy to manage, and the celerity with which he can get in his crops by its aid will enable him to clear his land from impediments to its working, which the dilatory and only partial labor performed by the plow would not. The great advantage of such a machine, however, would be in the vast prairie cultivation of the western States, on broad river bottoms, and in large fields, where the surface lies smooth, free from stones or other impediments and where a timely cultivation and deposit of the seed is indispensable to successful cropping. Sugar and cotton lands, as well as those for corn, wheat and other grains, will be immensely benefitted by this rapid cultivation. The present season, by its continuous Spring weather, so timely for plowing, seed-sowing and germination, as well as for the after-growth of the plants for several weeks in succession, in several of our States, most fortunately rendered a service not often witnessed. The same genial action of the element, in a much briefer time, by the aid of a rotary digger, would enable the cultivator to get his seeds well into the ground, and secure a favorable crop during ordinary seasons, unlike the present through which we have passed.

We could discourse further on this subject—hardly, perhaps, to the edification of our readers; and this must suffice for the present. We trust that, before the autumn agricultural and mechanical exhibitions are ended, we shall learn that something better than a steam plow has been attempted, if not effected; and that an implement, on the principal of the rotary digger, may be placed before our farmer friends, to give them a more thorough cultivation of their soils than ever before.

FACING FORTS WITH IRON PLATES.

The numerous experiments in England and France having proved that a solid wrought-iron plate, 4½ inches thick, is absolutely cannon proof, resisting even the elongated bolts of the Armstrong gun, the suggestion naturally occurs that these plates would be the proper facing for the walls of fortifications. As the battering down of the walls of a fort with siege guns, once placed in range, is a mere question of time, which may be counted on with almost as much certainty as the time required to dig a cellar, the question has been seriously propounded by the London *Times*, and other journals of character, whether walled fortifications should not be abandoned altogether, and resort be had to earth-works alone for defense. But if forts can be made impregnable, the question of their utility will be settled. There would seem to be, at least, no doubt about the propriety of facing the embrasures with iron.

NEW BOOKS AND PERIODICALS RECEIVED.

CAMILLE, OR THE CAMELIA LADY. From the French of Alexandre Dumas, the younger.

This work we have not read, and therefore cannot speak of its merits or demerits. We have generally thought our time could be more profitably employed than in the reading of fictitious works. They are ordinarily of but little account, and do more harm than good. If any one wishes to procure the work, he can obtain it from those well-known publishers, Messrs. T. B. Peterson & Bros., Philadelphia, Pa.

We have received from Messrs. Crosby, Nichols, Lee & Co., publishers, Boston, Mass., the following new publications:—

THE KANGAROO HUNTERS, OR ADVENTURES IN THE BUSH. By Ann Bowman. JACK IN THE FORECASTLE, or Incidents in the Early Life of Hawser Martingale, Author of "Tales of the Ocean," "Salt Water Bubbles," &c. THE ADVENTURES OF JAMES CAPEN ADAMS, Mountaineer and Grizzly Bear Hunter, of California. By Theodore & Hittell. These works are all profusely illustrated and will supply instruction and amusement for many happy fire-side circles. They may be obtained of R. Lockwood & Son, New York.

THE TINMAN'S MANUAL AND BUILDER'S AND MECHANIC'S HANDBOOK. By I. R. Butts; published by I. R. Butts & Co., Boston, Mass. 204 pages. A very useful little book.

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RECENT AMERICAN INVENTIONS.

The following inventions are among the most useful improvements patented this week. For the claims to these inventions, the reader is referred to the official list on another page:—

AIR ENGINE.

This invention consists in the arrangement of a flame space between the supply cylinder and the working cylinder, whereby a more intense and quicker heating of the air in said cylinder is effected, also in the arrangement of an eccectric frame suspended from a suitable pivot, and operated by an eccentric in such a manner, that the supply piston receives the desired motion in advance of the working piston, and that a reversing of the engine is rendered possible; also in the combination with the supply piston of the regenerator in such a manner that both move together, and that the air, in passing from one side of the piston to the other, is compelled to pass through said generator, where it takes up the heat stored up therein, so that when it arrives in the center of heat, it takes but little time to heat it to the desired temperature; and it further consists in the arrangement of a reversible eccentric, in combination with a spring bar, for the purpose of opening and closing the exhaust valve instantaneously as the crank passes its center. The credit of this invention is due to Dr. A. A. Henderson, of Portsmouth, N. H.

REVOLVER.

This invention consists in the employment, in combination with a cylinder having its chambers opening into its rear face, of a recoil shield made separate from the frame of the arm, and moveable transversely thereto, in such a manner as to expose the rear openings of the chamber to permit the insertion of cartridges thereat, the object being to make an arm of cheap construction, and to obviate the necessity of either taking out the cylinder, or opening the frame to insert the charge. This invention was designed by A. J. Gibson, of Worcester, Mass.

STEAM ENGINE.

The principal objects of this invention are, first, to enable a steam engine having a long cylinder, and consequently a long stroke of piston, to be brought within a comparatively small space; and second, to enable two complete revolutions of the crank shaft to be produced by the stroke of the piston back and forth. The invention consists in connecting the piston rod and crank of an engine by means of a system of toggles and connecting rods applied and arranged in a peculiar manner, whereby the above objects are accomplished, and an engine possessing superior qualities for driving the screw propeller is obtained. The patentee of this invention is R. C. Barton, of Troy, N. Y.

PEN CLEANER.

With pens, especially with pens made of metal, such as steel or gold it is of the greatest importance that the same should be kept clean, because the ink, when left on the pen, is liable to cause the same to corrode, and to diminish its proper elasticity and smoothness, and because the ink, when not cleaned off from the pen, becomes thick and causes the pen to write bad. It is obvious that the cleaning of the pen can be accomplished with the greatest ease and perfection in liquid which dissolves the ink. To effect this purpose is the object of this invention, which consists in the arrangement of a bottle of peculiar form, and provided with a brush which is firmly sprung into the bottle in such a manner that some suitable fluid may be introduced into the bottle, and the pen may be thoroughly cleaned. The inventor of this ingenious device is Jonathan Warren, of Brooklyn, N. Y.

THE LAST COTTON CROP.

The New York *Shipping List* makes up the account of the cotton crop annually on the 31st of August. It appears that the crop ending August 31, 1860, amounted to 4,675,770 bales, distributed as follows:—

	Bales.
New Orleans	2,139,425
Alabama	843,013
Texas	252,424
Florida	192,724
Georgia	531,219
South Carolina	510,109
North Carolina	41,194
Virginia	56,987
Tennessee	108,676
Total	4,675,770
Taken for home use north of Virginia, bales	792,521
Taken for home use in Virginia and south and west of Virginia, bales	185,522
Total consumed in the United States, including burned at the ports, bales	978,043

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING OCTOBER 9, 1860.

[Reported Officially for the SCIENTIFIC AMERICAN.]

*** Pamphlets giving full particulars of the mode of applying for patents, size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

30,282.—F. B. Abbott, of St. Louis, Mo., for an Improved Quartz Crusher and Amalgamator:

I claim, first, The use of the heater, R, in combination with the boiler and crusher, when arranged in the manner described for the purpose specified.

Second, I claim constructing, arranging and operating the amalgamator, substantially in the manner described for the purpose specified.

Third, I claim arranging the engine and boiler with the crusher and amalgamator, substantially in the manner described, for the purpose of economiziug in the room, weight and cost of quartz crushing apparatus.

30,283.—A. L. Adams, of Philadelphia, Pa., for an Apparatus for Copying Letters:

I claim the employment of the retaining hooks, d d, or their equivalents, in combination with the roller, B, and its apron, C, whether the said roller and apron are used in connection with the board, A, or are applied directly to a copying-book, as set forth.

30,284.—Josiah Ashenfelder, of Philadelphia, Pa., for an Improvement in Transferring Railroad Cars from one Track to Another:

I claim the employment, in connection with the sidings or turnouts of railroads, of a supplementary inclined rail, in combination with car wheels, so constructed in respect to said supplementary rail, which is so arranged in respect to the rails of the straight and of the deviating line of road that the wheels are moved from the influence of the rails of the one line of road to that of the other, as described.

30,285.—H. Beamer, of Smithburg, Pa., for an Improvement in Fruit-driers:

I claim, first, In combination with the drawers or trays, E, the double inclined hinged covers, B B, and hinged gables, C C, arranged as represented, so as to protect or expose said trays, in the manner and for the purpose set forth.

I also claim, in combination with the drying chamber, the hinged frames, E, that may be swung into or out of said chamber, for the purpose of protecting or drying by artificial heat inside, or exposing the fruit to the air or sun as circumstances may require, and as set forth.

30,286.—Aaron Bechtol, of Berkley Springs, Va., for an Improved Bedstead Fastening:

I claim the bed posts mortised as described, in combination with a bed frame mortised in a corresponding manner, as that the two ends of the frame may be supported across their entire width by means of transverse rails and the posts and frame held together by means of adjustable dogs or buttons, substantially as and for the purposes set forth.

30,287.—James A. Bennet, of King's County, N. Y., for an Improvement in Propelling Cars on Railroads:

I claim the combination and arrangement of the entire machine for propelling machinery, cars on railroads, and other vehicles, as described in this specification, consisting of springs, cog wheels, ratchets and levers.

30,288.—J. A. Berrill, of Waterville, N. Y., for an Improved Paint Mill:

I claim forming the periphery of the rotating grinding plate, A, with a recess, a, to provide a ledge, b, as and for the purpose set forth.

[The object of this invention is to prevent the paint as it is ground from flying off from the runner or revolving grinding plate as it is discharged from between said plate and the upper stationary one.]

30,289.—P. I. Biderman, of Philadelphia, Pa., for an Improvement in Conveying City Railroad Cars over Obstructions:

I claim raising and lowering the forward and rear trucks of the car, substantially in the manner specified, whereby the car wheels are elevated so as to pass over obstructions upon the track, as and for the purpose set forth.

30,290.—W. O. Bourne, of New York City, for an Improvement in Ore Separators:

I claim, first, A bed for separating ores or similar substances, composed of layers of fibrous or woven materials, secured by stitches or equivalent means for maintaining a fixed and firm support to said bed, and preventing unevenness and bagging, as set forth.

Second, In combination with a bed, constructed as set forth, I claim the adjustable plate or rim, f, for regulating the depth of the ore on the bed, as described.

30,291.—Wm. Breitenstein, of New York City, for a Fire-escape:

I claim, first, The construction of the ladder, consisting of several sections joined and hinged, substantially as described.

Second, The secure folding and unfolding of the ladder, by means of the windlass, H, the reel or drum, D, and the ropes, H, substantially as specified.

Third, The manner of attaching the escape box, N, to the ladder, and of sliding it on the same, substantially as set forth.

Fourth, The manner of adjusting the carriage and frame, A, to any position required, by means of the division of the frame, and the insertion of lever screw and handle, P P, substantially as specified.

Fifth, The general construction of the machine, in the manner and for the purpose substantially as described.

30,292.—Frederick Brubach, of Lancaster, Pa., for an Improvement in Wooden Coffins:

I claim the combined framework of the coffin lid, A B C D, and pins, d, with the glass plates, E, inserted, the loose panels, G H, with their pins, K, and lock button, I, when made substantially as specified, for the purpose set forth.

30,293.—I. C. Bryant, of Philadelphia, Pa., for an Improvement in Casting Embossed Type:

I claim, first, The combination of the bottom and top letter or letters in a frame made of iron, brass, copper, or any other metal, suitable for the purpose.

Second, I claim the arrangement of the openings in the top letters, for putting in the steel, iron, or brass wire, forming the points or projections on the face of the type.

Third, I claim the combination of one or more guide letters at the top, with one or more letters at the bottom, formed so as to give the desired shape in points or projections to the letters or designs to be cast.

Fourth, I claim the combination of separate pieces of steel, iron, or brass wire, round, square, or any other shape suitable, in connection with frame and guide and bottom letters or designs.

Fifth, I claim the combination of points, so as to form a letter or letters, and solidifying them by casting type or other metal around them in a mold and double matrice, as described.

Sixth, I claim the mold, in connection with the matrice, slide and pin, as described.

30,294.—Patrick Burke, of Helena, N. Y., for an Improvement in Stabling Cows:

I claim the arrangement of the perforated floor, G, and rollers, E, with the tight floor, D, and manger, A, as and for the purposes set forth and described.

[The object of this invention is to stable cattle in a more cleanly and healthy manner than has heretofore been done; at the same time to offer many advantages in the removing of manure from the stable, the saving of urine, and the cleaning out of the stable both before and after milking.]

30,295.—N. C. Carter, of Union City, Ind., for an Improvement in Cultivators:

I claim the arrangement of rods, c c, rods, e e, with the looped heads, e' e', and terminal screw bolt, d', in connection with rods, g and h, and screw link, i, all constructed and operated in the manner as and for the purpose set forth.

30,296.—Ezekiel Casner, of Penn Yan, N. Y., for an Improved Mill Bush:

I claim the combination of the case, A, bush blocks, E E E E, bottom plate, C, and bolts, F F, when made and used substantially as specified.

30,297.—Robert Cathcart, of Baltimore, Md., for an Improved Light for Cars:

I claim the arrangement in the manner specified of the conical reflector and lantern relatively to the lamp and roof of railway and other cars, for the purpose described.

30,298.—L. S. Chichester, of New York City, for an Improved Mill for Grinding Coffee:

I claim the adjustable cheek pieces, c c, formed with converging grooves, in combination with the oscillatiug or vibiating cylinder, h, as and for the purposes specified.

30,299.—D. W. Clark, of Stratford, Conn., for an Improvement in Stirrups:

I claim the making of the side pieces of stirrups adjustable in the manner and for the purposes substantially as shown and described.

I also claim the spring G, between the side pieces, when arranged and operating as set forth.

30,300.—T. C. Clarke, of Camden, N. J., for an Improved Filter:

I claim, first, In a filter for water, an opening or escape on the supply side of the filtering medium, controlled in the manner set forth and for the purposes specified.

Second, I claim the slide, I, in combination with the valve, h, for opening said valve to clean the filter or draw unfiltered water, as specified.

Third, I claim the construction of the divided case, c d, kept together by the turn buttons, e e, and provided with the ribs l l, forming the water channels, in the manner and for the purposes specified.

30,301.—C. P. Crossman and J. B. Brown, of Warren, Mass., for an Improvement in Stove Radiators:

We claim a heat radiating attachment for stoves, which is composed of an outer case, A, flanged opening, C, inner conical chamber B, filling, B', top plate, a' cold air pipe, D, smoke pipe E, oven above the chamber, B, with openings, b F, the whole being constructed as set forth and described, so as to be capable of application to the top-plates of common cooking and other stoves, all as set forth.

[The object of this invention is to obtain a portable and simple device that may be readily applied to ordinary stoves, and which will serve to retain the heat that usually passes up the flue, and render the same available for cooking purposes and also as a heat radiator.]

30,302.—Cyrus Debolt, of Ottawa, Ill., for an Improvement in Cultivators:

I claim the arrangement of the handles, C C, the joints, K K, the brackets, F, and the uprights, D D, for the purpose set forth and as described.

30,303.—Charles Doolittle, of Oswego, and Alfred Carson, of New York City, for a Fruit Case:

We claim the construction of the fruit case with a receptacle, B, springs, C, and an ice-chamber, f, the whole arranged and operating as and for the purposes set forth and described.

[This invention consists in placing the receptacle which is to contain the fruit, or other article or substance to be transported within a box or case, and connecting the former to the latter by means of springs, so as to admit of the receptacle having a certain degree of play or elastic movement within the box or case, and thereby protect the contents of the receptacle from concussions and sudden jars.]

30,304.—A. M. Dye, of Clinton, Ill., for an Improved Folding Bedstead:

I claim constructing the bed post in two sections, D and E, when made to be conjoined by the ring, C, or its equivalent, and secured in an upright position for use by the screw bolts, c c, and thumb nuts, g g', and when made to fold or turn upon said screw bolts, c c, for the purpose of making the whole bedstead compact and portable, substantially as described.

30,305.—Lewis Evans, of Morgantown, Va., for an Improvement in Breech-loading Ordnance:

I claim, first, Locking the breech-piece, F, in the breech end of the barrel, A, by means of a hinged lock bar, J, passing through a slot in the breech piece, and corresponding slots in the breech end of the barrel, as and for the purposes described.

Second, Operating the hammer, F', by means of a hinged dog, E, and crank shaft, B as and for the purposes described.

Third, Adjusting the breech-piece in line with the barrel, by means of toothed brackets, L, moving in vertical ways as and for the purposes described.

Fourth, The combination of the breech-piece, F, with a sliding standard, R, spring catch, O, pin, Q, incline, T, and rack gear, W V, for the purposes described.

30,306.—John Ericsson, of New York City, for an Improvement in Air Engines:

I claim, first, The combination of the equilibrium cylinders, a b, the equilibrium pistons, f g, and the working piston, e, when used substantially in the manner and for the purposes set forth.

Second, The combination of the equilibrium cylinders, a b, the equilibrium pistons, f g, the valves, 5 and 6, the vessel, k, and the tubes therein contained, when used substantially in the manner and for the purposes set forth.

Third, The combination of the equilibrium cylinders, a b, the equilibrium pistons, f g, the valves, 3 and 4, and the heat deposit vessel, h, when used substantially in the manner and for the purposes set forth.

Fourth, The combination of the equilibrium cylinders, a b, the

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equilibrium pistons, f g, the valves, 5 and 6, and the heater, i, when used in the manner and for the purposes set forth.

Fifth, The combination of the equilibrium cylinders, a b, the equilibrium pistons, f g, the valves, 1 and 2, and the cooler, n, when used in the manner and for the purposes set forth.

Sixth, The combination of the equilibrium cylinder, a, the equilibrium piston, f, the valve, 5, and the bent pipe, h' h' h', when used for the purposes set forth.

30,307.—L. Y. Gardiner, of Amsterdam, N. Y., for an Improvement in Window Sash Supporters:

I claim the india-rubber (traveling) ball or roller, a, and the groove or guide, b, when constructed and arranged substantially as set forth.

30,308.—W. M. Garee, of Cox, Ohio, for an Improvement in Seeding Machines:

I claim the arrangement of the spring, B, jaws, D E, and board, C, with the slide, F, box, A, guard plate, j, and brush, h, all as set forth and described, for the purposes set forth.

[This invention relates to that class of seeding machines which are o rated manually and are carried in the hands of the operator, and is an improvement on a machine formerly patented by this inventor.]

30,309.—A. J. Gibson, of Worcester, Mass., for an Improvement in Revolving Fire-arms:

I claim the transversely movable recoil plate, D, applied in combination with the chambered cylinder, substantially as and for the purpose specified.

30,310.—W. L. Gilroy, of Philadelphia, Pa., for an Improved Paint Can:

I claim constructing the upper end of the body of the vessel, A, with the wired boundary edge or rim, d, and the inner bead, f', substantially in the manner and for the purpose set forth and described.

30,311.—C. Gloyd, of Wynant, Ohio, for an Improved Frame for Bill of Fare:

I claim the arrangement of the arms, A, supported by legs, B, and provided with recesses, b, in combination with the frames, D, constructed and operating substantially in the manner and for the purpose set forth.

[This invention consists in the arrangement of two arms supported by three or more legs, and provided with suitable slots or recesses to receive the frame in which the bills of fare are adjusted in such a manner that said bills of fare, when adjusted in the frames and placed in said arms, are visible by the persons sitting around a table, and that they can be seen and examined by different persons and from different sides of the table at one and the same time.]

30,312.—G. W. Grader and A. C. Wurzbach, of Memphis, Tenn., for an Improved Steam Gage:

We claim the employment of an air chamber, connected with the water space of the boiler, and interposed between it and the indicating gage, substantially as and for the purpose shown and described.

[This invention relates to pressing gages for steam or water. Its object is to prevent the steam or water ever coming in contact with the gage, thereby preventing its ever being overheated or frozen, and preventing the deposit of sedimentary matter within it. It consists in the employment of a column of air interposed between the steam or water and the gage, so that the gage is acted upon through the medium of air instead of directly by the steam or water.]

30,313.—J. T. Ham, of Senatobia, Miss., for an Improvement in Cotton Seed Planters:

I claim the combination of the bi-conical roller or hopper, C, with the adjustable rod, G, arranged for joint operation, as and for the purpose set forth.

I further claim, in connection with the roller or hopper, C, and rod, G, the adjustable arm, E, provided with the furrow openers, F C, and the adjustable bar, H, all being arranged substantially as and for the purpose set forth.

[This invention consists in the employment or use of a bi-conical roller or seed hopper, placed within a suitable frame, which is provided with an adjustable furrow opener, cover device and cleaner, all being so arranged whereby the desired work may be perfectly performed and the implement readily controlled by the attendant, and the ridges in which the seed is planted being not only preserved but also perfected during the planting operation, and left in a properly rounded state, with the earth well compacted on the seed.]

30,314.—L. H. Hasse, of New York City, for an Improvement in Submarine Lamps:

I claim the construction and arrangement of the submarine lamp, substantially as described, with a double bottom of the casing containing caustic potash, and with an exhaust pipe, for the purpose of easily removing the products of combustion.

And I also claim the submarine lamp, substantially as specified, in combination with the tubes, O and P, and with the piston, Q, working on a detonating compound for the purpose of igniting the same, substantially as set forth.

30,315.—A. A. Henderson, of Portsmouth. N. H., for an Improvement in Caloric Engines:

I claim, first, The arrangement of the flame space, a*, between the cylinders, A and G, substantially as and for the purpose set forth.

Second, The arrangement of an eccentric frame, P, and reversible eccentric, N, in combination with the supply piston, J, constructed and operating substantially as and for the purpose specified.

Third, The combination of the regenerator, J3, with the supply piston, J, constructed and operating substantially as and for the purpose described.

Fourth, The arrangement of the reversible eccentric, X, in combination with the spring rod, d, and exhaust valve, b, constructed and operating in the manner and for the purpose set forth.

30,316.—Daniel Herr, John Herr and J. F. Herr, of Lancaster, Pa., for an Improvement in Corn Planters:

We claim the combination and arrangement of the cogged cam, M, slotted sliding ledge, D, connecting blocks, C C3, sliding valves, A, with their openings, 3 3, and pegs, 2, together with the hopper and shovel support, E, on the pivoted side pieces, F, and cam support, L, simultaneously operated by the lever, Z, substantially as set forth and specified.

30,317.—Joseph Hill, of Brooklyn, N. Y., for an Improvement in Galvanic Plates for Medical Use:

I claim the galvanic foot plate or battery formed of the sections, a b c d, hinged or jointed together in the manner and for the purposes specified.

30,318.—James Hobbs, of Columbus, Ind., for an Improved Fire-escape:

I claim the arrangement of the clamping plates, B B', with the the screw, C, crank, c, and spring, b, as shown and described, for the purpose set forth.

[This invention consists in the arrangement of two friction plates with a series of studs placed in a zigzag line, and with a central regulating screw, in such a manner that said plates can be adjusted to suit different sized ropes, and that the friction of the rope passing over and around said zigzag studs can be regulated at pleasure.]

30,319.—R. W. Hoit, of Boston, Mass., for an Improvement in Apparatuses for Burning Gas:

I claim, first, Carrying off the unconsumed products of combustion of the flame or jet by forming within the apparatus itself ventilating flues, arranged and operating as described; the same consisting of the main stock, a a, and branch pipe, c, terminating in a bell-shaped mouth extending over the flame or jet, as set forth.

Second, So arranging and locating the gas-supplying pipes, or the reservoir from which all the branch pipes for conveying gas to the burners receive their supply that they or it shall receive, and be exposed to the upward heated currents that proceed from the flames or jets, substantially as described and for the purposes specified.

30,320.—Lewis Holcomb, of Granby, Conn., for an Improvement in the Method of Oiling Leather:

I claim the method of treating leather described, which consists substantially in submitting the leather, after it has been tanned, finished and covered with tallow, to the action of a hot smoothing iron, all as set forth.

[This invention consists in the application to the skins, after they have been tanned and finished and greased in the usual manner, of a hot flat iron, for the purpose of spreading the grease evenly over the skin, and to cause the same to combine with the fibers, rendering the skin tougher and more im rvious than when it is prepared according to the old method.]

30,321.—Gilbert Hubbard, of Montville, Mass., for an Improvement in Measuring Faucets:

I claim the piston and piston rod, D', inlet and discharge valve orifices with their v ves, a c' c', arranged as described, in combination with the rods, C and C', wheel, H, and pawls, G I, operated alternately by the rising and falling of the piston, the whole being arranged relatively with each other and operating substantially in the manner set forth.

I further claim the wheel, M, with its notches and teeth, i i, and stop pin, j, in combination with the index-registering hand, L, spring, k, wheel, h, pinion and shaft, g, and ratchet wheel, H, arranged substantially in the manner and for the purposes set forth.

[This invention consists in operating a plunger or piston placed within a cylinder communicating with the vessel from which liquid is to be drawn and measured, in such a manner that it will actuate certain valves and a train of wheelwork, and measure the liquid as it passes from the barrel into and from the cylinder. It also consists in combining certain mechanism with the plunger for operating the valves, and for registering the quantity of liquid to be measured.]

30,322.—Charles Hughes, of New Orleans, La., for an Improved Machine for Straightening Bale Hoops, &c.:

I claim the arrangement of the rollers, B B C C, and platforms, F F, with the paint trough, I, and drip box, G, as and for the purposes shown and described.

[This invention consists in the employment or use of two pairs of rollers in connection with a paint-trough or hopper and dip box, so arranged whereby metal hoops for cotton and other bales may be straightened and painted at one operation.]

30,323.—K. T. Hurlburt and Howard Thompson, of Port Byron, N. Y., for an Improvement in Operating Gates of Canal Locks, &c.:

We claim, in combination with a vertically rising and falling lock gate, a moving frame for receiving and carrying said gate around out of the way of passing boats or craft, substantially as described.

30,324.—G. C. Jenks, of New York City, for an Improvement in Letter Boxes:

I claim so notching or otherwise forming the edge of the ledge or ledges placed in the channel to the receptacle that the withdrawal of a letter shall be thereby prevented, substantially as described.

30,325.—Amos Jones, of Lebanon, N. H., for an Improvement in Roof Brackets:

I claim the employment of the adjustable clamping plates, a a, and screws, b b c, in combination with the stripe, A, hinged resting bar, B, rack plate, C, and hinged prop, D, all in the manner and for the purpose shown and described.

[This invention is a new and improved bracket for pitched roofs, to be used thereon for roofing, slating or for any kind of work where men are required to work on the roofs any length of time. The invention provides for forming a strong and safe staging on roofs which are very slanting, which staging may be applied to any roof or removed therefrom in a short time, and with comparatively little labor.]

30,326.—John Johnson, of Biddeford, Maine, for an Improvement in Steam Generators:

I claim the arrangement of the tubes, B, and valves, f, with each other and with the independent water heating case, A, in the manner shown and described.

[This steam generator and superheater is composed of a system of tubes so arranged within the upper part of an upright water casing, within whose lower part is arranged the fire-chamber, that water, after being heated in the said casing below the boiling point, can be fed to the upper and cooler part of the system of tubes in just such regulated quantities as will produce the necessary supply of steam, and may circulate toward the lower and hotter part of the system; but before its arrival at the lower part of the system, may be all first converted into steam and afterward superheated. The object of the invention is more especially to economize fuel.]

30,327.—F. W. Kroeber, of Forbestown, Cal., for an Improved Gate and Door Swing:

I claim the application of the incined plane, the wheel, the lever and the spring to the adjusting of gates and doors to any required position.

30,323.—T. S. La France, of Elmira, N. Y., for an Improvement in Pistons for Steam Engines:

I claim, first, The combination of the hollow piston rod, A, with the rod, B, when the said rod, B, is provided with inclined planes which act upon radial studs, in the manner and for the purpose specified.

Second, Elevating or depressing the rod, B, by means of nuts acting upon the screw bolts, f and g, when the latter are placed at the extremities of the cross bar, K, in the manner and for the purpose set forth.

30,329.—A. J. Laird, of Middletown, Pa., for an Improved Arrangement for Operating the Valves of Steam Engines:

I claim the vibrating and sliding bar, C, in combination with the rocker arm, D, substantially as set forth, for operating the valve motion of steam engines.

30,330.—S. T. Lamb, of New Washington, Ind., for an Improvement in Harvesting Machines:

I claim, first, In combination with the pulley and crank and the semi-clutches formed thereon, and the spring for holding them together, the several devices that enable the driver, from his seat, to unclutch them for the purpose stated, said devices being arranged substantially as described.

I also claim, in combination with an automatic rake, the making of the teeth three sided, and presenting one of the sides thereof to the grain, when said teeth are inclined on the rake head from its heel towards its point, for the purpose of allowing the rake to clear itself from the grain, substantially as described.

I also claim, in combination with a sweeping rake, such as is represented, the interposing of the springs, f and g (the former traveling with the rake and the latter stationary on the platform), between the rake and the part or point upon which it drops, when said springs are so arranged as not to retard the movement of the rake by their recoil, and so that the raising or lowering of the rake shall not be injuriously affected by any sudden jarring of its parts, but have a free and easy movement, as described and represented.

I also claim, in combination with a traveling rake, the traveling support, f, substantially as and for the purposes specified.

30,331.—A. F. Lapham, of New York City, for an Improved Washing Machine:

I claim the air-tight cylinder, d, when constructed with transverse circular ribs, e, as described, and arranged to revolve endwise together with the loose balls, f, substantially as set foath.

30,332.—J. P. Lindsay, of New York City, for an Improvement in Locks for Fire-arms:

I claim the use of the detent in combination with the hammer and trigger, when the whole is constructed, combined and made to produce the required result, substantially as set forth.

30,333.—D. G. Littlefield, of Albany, N. Y., for an Improvement in Furnaces. Ante-dated July 3, 1860:

I claim the combination of the cold air channel, H, the perforations, s s s s s s s s, the register top to covering, L L L L, and the damper, R, the whole being constructed and arranged in the particular manner specified.

30,334.—F. H. Manny, of Rockford, Ill., for an Improvement in Winnowing Machines:

I claim the combination of the driving shaft, C, pitman rods, c', parallel bar, H, connecting rods, h h', and bell cranks, h2, with the removable nest of sieves, F', and screen, G, when the whole are constructed, arranged and operated in the manner described, for the purpose set forth.

30,335.—T. J. Mayall, of Roxbury, Mass., for an Improvement in Breech-loading Ordnance:

I claim, first, "Thumbing" the touch holes of the chamber automatically by means of the plate, o', operating as described, or any other equivalent arrangement of mechanical devices for accomplishing the desired result.

Second, Preventing the accidental non-discharge of any one chamber from disorganizing the apparatus by means of devices operating as described, to throw the rammer out of gear and prevent ng its inserting another cartridge, and then throwing it into gear again to be in readiness to perform its functions for the next succeeding chamber.

Third, In combination with the rotating magazine, the needle rod, N', operated automatically as described, and connected with a galvanic battery, so as to ignite the charges at the proper times, as set forth.

Fourth, The a angement of the gears, N O and P, and their swinging arms operating together as described, so as to permit the gun carriage to travel back and forth without disconnecting the devices which communicate motion to the machinery from the driving shaft.

Fifth, The sponging or "swabbing" of the chambers of the magazine by means of the devices operating as described, the same consisting of the rod, D', carrying a suitable sponge jointed to a right angular lever, actuated by a suitable cam, as set forth.

30,336.—Charles McCarthy, of New York City, for an Improved Safety Apparatus for Steam Boilers:

I claim the arrangement and combination of the pipe, E, with a safety valve, in such a manner that, by any excess of pressure in the boiler, the water from the lower part of the boiler shall be forced up said pipe, E, to open said valve and pass upon the fire, or made to give an alarm, the whole being constructed substantially as set forth.

30,337.—James McMahan, of Amelia, Ohio, for an Improvement in Window Sash Supporters:

I claim the elastic lining strips, a a, and the rollers, d d, when employed in a window frame and sash, substantially as and for the purposes described.

30,338.—G. R. Meneely, of West Troy, N. Y., for an Improvement in Hanging Bells:

I claim, first, In uniting the bell to the rocking or revolving yoke, the employment of the flanged and slotted, round, tapering neck, F, cast on the bell, the round tapering hole, G, made in the yoke, the mo able perforated cap, H, and the series of screw bolts, K; all constructed and arranged in combination substantially as described.

Second, I also claim securing the supporting bolt, C, of the clapper to the yoke, D, by means of a key, Q, formed and applied to the clapper bolt and to the yoke, and arranged with the parts by which the bell is united to the yoke, as described, so that the clapper will be thereby prevented from being turned in the yoke with the bell when the parts by which the bell is secured to the yoke are turned in the yoke with the bell about the clapper bolt.

30,339.—Titus Molinier, of New Orleans, La., for an Improvement in Apparatus for Scumming:

I claim the described crank-skimming machine, consisting in three essential parts—a frame, A, a pushing and drawing screw, B, and a movable basin, C, at the end of the box, D, sliding in frame, A, said box, D, having in its interior a system of paddles; by which machine the cane juice contained in the last kettle of a set of sugar kettles may be skimmed clean in any easy, prompt, and efficacious manner.

30,340.—Charles Newcomb, of New York City, for an Improvement in Apparatuses for the Ventilation of Railroad Cars:

I claim the combination with the main pipes running along the train of cars, as described, of perforated pipes within the body of the cars and below the ceiling, together with their dampers, the whole being arranged to be operated as described, so that each car may be supplied with the requisite quantity of fresh air free from dust, smoke or cinders, and without such ventilation of one car interfering with that of the other.

30,341.—J. W. Palmer, of Port Republic, and J. K. Leeny, of Tom's Brook, Va., for an Improvement in Bee-hives:

We claim, first, The combination of the partitions, B B, and the slides, C C, each being provided with openings which correspond, the partitions being provided with dovetail grooves upon one side for receiving the slides, two being placed back to back with the slides together, substantially as and for the purpose specified.

Second, The funnel-shaped box, E, the pipe, F, and the bag, C, when the same are arranged in the manner and used for the purpose of making a bee-feeder, substantially as set forth.

30,342.—J. Y. Parce, of Fairport, N. Y., for an Improved Packing Press:

I claim the combination and arrangement of the foot lever, B, stirrup rods, b b, jointed elbow lever, d, and pawl, g, operating conjointly, substantially as set forth and described.

I also claim the follower plate, m, attached to the packing box, K, substantially as and for the purposes set forth.

30,343.—Edward Pave (assignor to himself and C. H. Delamater), of New York City, for an Improved Forge Hammer:

I claim an elastic or yielding connecting rod, constructed as described or in some equivalent manner.

I claim an elastic or yielding connecting rod, or its substantial equivalent, in combination with the vibrating arm or lever that operates it to work the hammer.

I claim connecting the connecting rod to the arm or lever that operates it by means of a slide arranged to traverse on said arm, so

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as to vary the length of the stroke and the force of the blows struck by the hammer while in operation and without stopping it.

I claim the crank which operates the hammer, in combination with an elastic or yielding connecting rod.

I claim balancing the helve and hammer by springs arranged on one or both sides of the fulcrum.

30,344.—J. M. Perkins, of Chicago, Ill., for an Improved Picnic or Excursion Seat:

I claim the portable picnic seat constructed as set forth.

30,345.—John Pettingell, of Lowell, Mass., for an Improvement in Chimney Tops:

I claim the construction of the chimney top with the inclined plate, a, to direct the air upward, the rim, b, to assist the draft, the rim, d, to bind the brickwork between it and the lower rim, c, and the molding, e, to connect the said lower rim, c, with the plate, a; the said molding being joined to the plate a little inside of the edge thereof, so as to leave a dripping edge; the whole being intended to be cast of metal in one piece, all as shown and described.

30,346.—J. J. Pike, of Chelsea, Mass., for an Improved Carriage Jack:

I claim my improved carriage jack as constructed with the extra bearing lever, C, combined and arranged with the lifting lever, B, and the supporting frame, A, substantially in the manner and so as to operate as described.

And I also claim the combination and arrangement of the two spring stopping levers, k l, and the pin, P, with the levers, B and C, applied within the frame, A, and with respect to one another as specified.

30,347.—Joseph Pine, of New York City, for an Improved Apparatus for Heating Railroad Cars:

I claim the arrangement of the heaters, F F, with the outside end platforms, B B, plates, b b, boxes, J, and gratings, d, as shown and described, whereby the driver and conductor, and others standing upon platforms outside of the car, will receive the benefit of the heaters as well as the passengers occupying the interior.

[This invention is a new and useful method of warming city cars, so as to make them comfortable to the passengers and to the driver and conductor. It is intended more especially for the street cars where it is desirable to economize space in the car, and where stoves could not be practically used. The invention consists in arranging under the platform of the car double-wall furnaces, and in conducting the air which is heated between the walls of each furnace through a flue or flues that are enclosed by smoke flues, through the middle or along each side of the floor of the car from front to rear thereof, and finally conducting it off through flues at each end of the car.]

30,348.—W. G. Pollock and J. W. Sener, of Fredericksburgh, Va., for an Improvement in Seed Planters:

We claim, first, The vibrating, adjustable rake frame, E, constructed and arranged and operating as described.

Second, In combination with a seed planter, fixing the central pressure roller to the shaft, S, while the slide rollers are loose upon it in the manner and for the purpose set forth.

Third, The combination and arrangement of the cylinder, C, frame, F, and pressure rollers, R R', in the manner set forth and shown, when used in a seed planting machine.

30,349.—D. S. Quimby, of Brooklyn, N. Y., for an Improved Fireplace Heater:

I claim the arrangement of the fireplace box, F, perforated plates, A B C D, with the flues, G G', and flue, E, arranged and operated as described.

30,350.—C. L. Rehn (assignor to J. Lucas & Co.), of Philadelphia, Pa., for a Fastening for Metallic Kegs:

I claim the fastener, E, composed of the plate, f, and its two arms, e and e', when one or both of the said arms has a rounded end, x, and each arm has a notch, y, and when the whole is constructed as set forth for attachment and detachment from the staples, D and D', on the edge of the keg, by the method and for the purpose described.

30,351.—J. K. Robinson and J. M. Clark, of Bellaire, Ohio, for an Improvament in Pistons for Steam Engines:

We claim, first, The valve seat bolts constructed substantially in the manner and for the double purpose described.

Second, The combination of the key, h', with the rims, b c, on the piston head and follower, substantially in the manner and for the purpose described.

30,352.—H. D. Rogers, of Grafton, Ohio, for an Improvement in Securing Points to Plows:

I claim the securing the point, B, by means of the shoe, A, hook, D, and set screw, E—the whole being arranged in the manner and for the purpose as described.

30,353.—John Ruegg, of St. Louis, Mo., for an Improved Brush Machine:

I claim the combination of what I have above denominated the "adjusting head" with what I have above denominated the "cutting or trimming head," in the manner described; and I also claim making the said adjusting and trimming heads, in the manner described for the purpose specified.

30,354.—M. E. Rudasill, of Shelby, N. C., for an Improvement in Pumps:

I claim the arrangement of the plate, A, box, C, and cylinders, B B, with the pistons, I I, springs, F F, hollow shaft, D, and cam cylinder, E—the several parts being connected and made to operate substantially as and for the purpose specified.

30,355.—C. J. Schueder, of Astoria, N. Y., for an Improved Propeller:

I claim the arrangement of the rod, H, lever, g, rods, h, and braces, i, with the two sleeves, G H, bars, c d, and sheet, E, as and for the purposes shown and described.

[The object of this invention is to produce a propeller which imitates the action of the foot of a duck or frog, so that by its application a boat may be propelled without creating a swell, rendering this propeller peculiarly useful for canal boats.]

30,356.—Robert Scott, Jr., of Madison, Ind., for an Improved Cotton Press:

I claim the arrangement of the lever, B, arm, K, connecting piece, J, and head, D, with the cords, G H, lever, C, head, E, lever, e, connecting piece, F, and cords, I and L; the whole being constructed and operating in the manner and for the purpose specified.

30,357.—M. G. Slemmons, of Cadiz, Ohio, for an Improvement in Plows:

I claim the arrangemeut of the two curved, shouldered beams, A A a, clevis, B, transverse bar, D m, slotted, adjustable, forked handles, E E b, and notched and morised shovels, C C e, in the manner and ior the purpose described.

30,358.—C. Snyder and S. M. Smith, of Hawley, Pa., for an Improved Portable Crane:

We claim the combination with the extension mast and adjustable crane arm, E, of the extension braces, when the same are constructed and operate substantially as and for the purposes set forth.

[This invention is a portable extension crane which is so constructed that it can be readily set up from place to place in any building, from eight to ten feet, more or less, between the floors. The invention consists in combining with an extension mast and adjustable crane arm, an extension brace for supporting the arm at any elevation to which it is capable of being placed.]

30,359.—Henry Snyder, of Dayton, Ohio, for an Improvement in Machines for Pulling and Cutting Stalks:

I claim the employment or use of the wheels, J J, having an oblique position with the wheels, B B, and provided with hooks or cutters, O, in combination with the bars or knockers, P, or their equivalents, essentially as and for the purpose set forth.

[The object of this invention is to obtain a simple and efficient machine by which old cotton stalks may be eradicated or pulled out of the earth by the roots, to make way for a succeeding crop; the invention being also applicable for cutting standing corn stalks.]

30,360.—Henry Stanley, of Troy, N. Y., for Improved Propellers in their Application to Vessels:

I claim the employment of two propellers having conical hubs and blades, as described, at the bow or stern of a vessel, substantially as and for the purposes set forth.

I also claim, in combination with the cone-formed hub and spiral blades, as above set forth, the backward inclination of said blades at the bows and the forward inclinasion at the stern, of those blades, as and for the purposes described.

I also claim the combination of twin bow and stern propellers, as described, attached to the same boat, for the purposes set forth.

30,361.—Achilles St. Dezier, of Plaquemine, La., for an Improvement in Cane Harvesters:

I claim the combination of the rotating cutter wheel, G, moldboard, H, and guides or plates, d f, the latter being attached to the runners, E I, and all arranged as and for the purpose set forth.

[This invention relates to a new and improved machine for cutting standing sugar cane and depositing it, as cut, in windrows parallel with the rows in which it grew. The invention consists in the employment of a rotary cutter in connection with a moldboard and guide plates, all being attached to a suitable frame and arranged in such a manner as to constitute a very simple, efficient and economical machine for the desired purpose.]

30,362.—Isaac Stoddard, of Great Bend, Pa., for an Improvement in Propelling Machinery by Horse Power:

I claim the arrangement of rollers, R R, wheel, W, standards, s s s, block, B, cranks, c c, band wheels, D D, pinions, G G, and segments, o o; the whole combined and operating substantially as set forth.

30,363.—S. D. Stout, of Charleston, Tenn., for an Improvement in Pumps:

I claim the three-chambered box, A, with its valves, b b and d, and leader pipe, B, in combination with the air pipes, C C', cut-off box, E, and bellows, G, or its equivalent; the whole being arranged substantially as and for the purpose described.

[This invention consists in the employment of compressed air in a novel manner for forcing water up through a pipe from the bottom of a well, or other low level, in a continuous stream. The invention further consists in the use of a vibrating cut-off for conducting air alternately to the two side compartments of the valve box.]

30,364.—J. B. Suitt, of Indianapolis, Ind., for an Improved Device for Operating t e Tilting Tables in Shingle Machines:

I claim the folding lever spring, K, with shoe, J, and weight, L, with weighted table, F, when operated in connection with the wheel, B, cam, C, connecting arm, P, or their equivalents, as and for the purposes set forth.

30,365.—G. W. Van Deren, of Big Flatts, N. Y., for an Improved Valve for Steam Engines:

I claim the construction of the valve with a shoulder, a, at its extremity and with a projection, B, extending beyond its periphery and otherwise made as shown and described, for the purposes set forth.

[The object of this invention is to construct an oscillating steam valve in which the pressure of the steam has little or no effect to increase the friction of the valve, so that the same works with equal facility when under pressure as it does before the steam is let on.]

30,366.—M. W. Warne, of St. Louis, Mo., for an Improvement in Filters:

I claim the employment or use of a cylinders, C D E, one or more placed within a water cooler, A, and provided with a suitable filtering medium, F, and iron and sulphur, H G, essentially as as and for the purpose set forth.

[This invention consists in arranging the parts of a filter in such a manner that the water will pass upward through a proper filtering medium, and cause the impurities to settle at the bottom, the filtering medium being placed within suitable boxes or receivers in a cooler, and used in connection with iron and sulphur, so that the water, while being purified and cooled, will also be medicated.]

30,367.—J. L. Wells, of St. Louis, Mo., for an Improvement in Compositions for Tanning:

I claim the compound composed of the constituents specified.

30,368.—George Wheeler, of New York City, for an Improved Keyhole Guard:

I claim the guard, D, constructed so as to be attached to an ordinary key, and operate substantially in the manner and for the purpose set forth.

30,369.—J. R. Williamson, of Washington, D. C., for an Improvement in Stirrups:

I claim the rotating and oscillating step, having friction rollers or their equivalents, on both the step and sides of the bow, constructed and arranged in the manner and for the purposes specified.

30,370.—Isaac Wiswell, of Springfield, Vt., for an Impr vement in Combined Window Net and Sash:

I claim the arrangement of the nettings and rollers, D D', with the sashes, B B', in the manner shown and described, so that when either of the sashes are opened the netting will follow the sash and protect the space, and when either sash is closed, the netting appended thereto will be rolled up, all as set forth

[This invention consists in applying in a novel manner to window sash, a screen or mosquito net, which will be operated by the raising or lowering of either top or bottom sash, so as to close up either the upper or lower half of the window. This netting is applied either to the upper or lower sash, or to both, if desired, in such a manner that it will roll up or unroll by simply moving the sash.]

30,371.—Samuel Wiswell, of Hyde Park, Vt., for an Improved Extension Wash Bench:

I claim the combination of two extension shelves, B and C, and an elevated frame or posts A, with the ordinary wash bench; all the parts being constructed and arranged as and for the purposes set forth.

[The object of this invention is to provide a convenient wash bench upon which may be placed a wash tub, a soap dish, a clothes wringer and a clothes basket. The relative positions of the tub, the wringer and the basket are such that the clothes, after being washed, may be passed from the tub through the wringer, and deposited into the basket, without any re-handling after being fed into the wringer.]

30,372.—C. W. Wood, of Worcester, Mass., for an Improvement in Breech-loading Fire-arms:

I claim, first, Limiting the amount of motion of the barrel by the catch or lever, G, when constructed and operating substantially as described.

Second, I claim making the lever, G, serve the double purpose of withdrawing the cartridge and limiting the amount of motion of the barrel, as set forth and described.

30,373.—C. C. Barton, of Troy, N. Y., assignor to E. D. Barton and W. J. Harlan, of Jersey City, N. J., for an Improvement in Steam Engines:

I claim the connection of the piston rod and crank of an engine by means of side rods, J J, and toggle rods, K K L, applied and arranged in combination with the cylinder, piston rod and crank substantially as specified.

30,374.—C. C. Crosby (assignor to himself and W. C. Gardner), of Nantucket, Mass., for an Improved Machine for Punching Nail Holes:

I claim the described application or arrangement of a sheet carrier and discharger, S, and a series of rollers, H H H H' H' H', with respect to the movable carriage, K, its supportin frame, A, and edge punching and bearing wheels, G E, applied to and operating with other punching and bearing wheels, substantially as explained.

And in combination with the carriage, K, and its discharging device, S, I claim the inclined struts arranged on both ends of the frame, A, in manner and so as to receive and guide a discharged and punched sheet of sheathing, as specified.

30,375.—John Gray, of Melrose, N. Y., assignor to himself, J. R. Weed and C. M. Clay, of New York City, and J. W. Danford, of Brooklyn, N. Y., for an Improved Washing Machine:

I claim the hollow vertical cylinder having open inclined slats and inclined ribs, b, to cleanse clothes or other materials by rinsing, in the manner specified.

30,376.—E. T. Green (assignor to himself and J. R. Folsom), of Stoneham, Mass., for an Improvement in Machines for Cutting Boot and Shoe Heels:

I claim the combination of a heel-cutting mechanism, operating substantially as specified, with a mechanism for relatively adjusting, in the direction of the length of the shoe, the tread and seat-formers, by which the rake or pitch of the rear of the heel may be varied without substitution of other formers.

Also, so arranging, in the heel-shaping machines, which operate substantially as described, of the forming and holding mechanisms, that each is distinct in itself, and removable one from the other, substantially in the manner and for the purpose set forth.

Also, the employment of the heel-seat portion of the sole for a former of the heel and guide for the knife, either with or without the use of the tread-former.

30,377.—Albert Kleinsteiber, of Milwaukie, Wis., assignor to W. Musgrove, of New York City, for an Improvement In Lamps:

I claim the tube, E, and piston, F, the latter being adjusted by the screw, C, or other device, in combination with a hollow wick formed of a straw, G, or its equivalent, and twist, H, essentially as and for the purpose set forth.

[The object of this invention is to obtain a lamp for burning lard, grease collected in cooking, &c., &c. The invention is designed solely for domestic or household use in rural districts, and to apply the majority of scraps and grease for illuminating purposes which are now used less advantageously.]

30,378.—H. L. McNish (assignor to himself and Dr C. Butler), of Lowell, Mass., for an Improved Barrel-head Machine:

I claim, first, Giving the saw a vibrating movement in a direction longitudinally with its axis and simultaneously with its rotation, by means of the cam, V, bars, P S, and spring, U, or their equivalents, for the purpose of cutting the heads in an oval or elliptical form, to compensate for the shrinking of the same, substantially as set forth.

Second, The arrangement of the slide, Q, cam, V, and screw, R, substantially as shown, for the purpose of varying, in a slight degree, the diameter of the heads, as set forth.

Third, The arrangement of the plate, Z, and circular plate, D'; the former being attached to the latter by the bolt, g', passing through the slot, r, and the plate, D', attached eccentrically to the bar, S, as and for the purposes specified.

Fourth, Connecting the shaft, K, with the bar, J, which is fitted loosely on the tubular upright, f, and arranged substantially as shown, to admit of the turning and adjusting of shaft, K, in a proper relative position with the saw shaft, A, for the purpose of driving both said shafts from one and the same counter shaft.

[See illustration in No. 8 of the current volume of our journal.]

30,379.—F. S. Sibley (assignor to himself and W. E. Doubleday), of Brooklyn, N. Y., for an Improved Method of Curling Hat Rims:

I claim the rope, strap or band, c, in combination with the dies, a and b, for drawing upon and curling the material forming the hat brim, as specified,

30,380.—Sylvenus Walker (assignor to himself and S. S. Hemenway), of Boston, Mass., for an Improved Sash Fastener:

In combination with the cross-bars of window sashes, I claim the arrangement of plates, A and B, when these are locked together by the hook of D, in the manner and for the purpose set forth.

RE-ISSUES.

E. L. Perkins, of Roxbury, Mass., for an Improvement in Machines for Drying Paper and other Fabrics. Patented June 7, 1859:

I claim, first, A drying apparatus, consisting of the combination of a dying chamber with inlet and outlet passages, for insuring a circulation through it, an apparatus for heating the same, and suitable carrying rolls for suspending the fabric vertically (or nearly so) in the drying chamber, and for carrying it into and through the same.

Second, I claim the within-described arrangement of the carrying rolls, e and e', with regard to each other, for the purpose of deflecting the fabr c from a vertical plane and into a series of zigzag planes, thereby making a series of bearing points, the effect of which is to distend the fabric equally and prevent it from roping up, as set forth.

J. R. Rogers, of Sacramento, Wis., for an Improvement in Percussion Seeders. Patented March 6, 1860:

I claim, first, The employment of the horizontal wheel, F, rovided with tapering flanges, when said wheel has a backward and forward rotary motion imparted to it, for the purpose of seeding by percussion and for lapping the grain, substantially as specified.

Second, The seed-shaker and regulator, c, in combination with the eccentric shaft, E, when the same are used as and for the purpose specified.

Third, The use of the rod, H, and cord, a, in combination with the shaft, E, and the flanged wheel, F, substantially as and for the purpose specified.

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D. W. Shares, of Hamden, Conn., for an Improvement in Harrows. Patented Jan. 27, 1857:

I claim a series of coulter teeth. H, formed substantially as specified, and arranged diagonally to the line of motion, so as to form a harrow that loosens, molifies and harrows the soil, as described.

I also claim the tooth, G, at the front end of the center bar, formed two divergent wings, in combination with a series of harrow teeth, H, on the diagonal bars, B B', as set forth.

H. Smith and D. B. Wesson, of Springfield, Mass., for an Improvement in Revolving Fire-arms. Patented July 5, 1859:

We claim the spring bolt, k, applied to the outer or curved part of the cylinder, in combination with the nose of the hammer, one of them being furnished with a wedge-shaped piece or projection, and the other with a spring projection, for the purpose specified.

Amos Whittemore, of Cambridgeport, Mass., for an Improved Machine for Making Horse-shoe Nails. Patented August 14, 1860:

I claim, first, The anvil, I, the same having both a rocking and reciprocating motion, in combination with adjustable or stationary dies, the faces of which shall be provided with a recess or groove for the purpose of preventing the pointing of the nail until its head and shank have been formed, substantially as set forth.

Second, I claim the pin, k', upon which is secured, permanently, the anvil, I, when the same shall be operated substantially as and for the purpose specified.

Third, I claim the mode of operating the shears or cutters, the same being made to advance at the proper moment to sever the nail from the rod, and then to fall back out of the way, substantially as and for the purpose described.

Fourth, I claim the various parts which constitute the feeding apparatus, consisting of upright, 5, levers, S and c, spiral spring, a, and rod, b; the whole being operated in the manner and for the purpose specified.

Fifth, I claim the levers, m and e, acting in conjunction to hold the rod while the nail is undergoing its formation, substantially as and for the purpose specified.

Sixth, I claim the sliding frame, D, in combination with the hammers, H H, each being operated upon substantially as and for the purpose described.

ADDITIONAL IMPROVEMENT.

T. T. S. Laidley, of the United States Army, for an Improvement in Tape Primer for Fire-arms. Patented February 15, 1859:

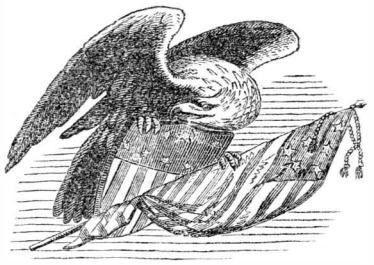
I claim making a continuous tape primer by inserting a cup or pellet, containing the percussion powder, in a recess or indentation formed in a strip of soft metal, alloy, india-rubber, gutta-percha, or other suitable material, and holding the cup or pellet in place by pressing the metal or substance of the strip partly over the outer edge of the pellet or cup, or by an easily-fusible solder securing the cup to the strip, or by means of a cement for that purpose.

DESIGNS.

S. H. Sailor and J. Steffe, (assignors to North, Chase & North), of Philadelphia, Pa., for a Design for Stoves.

Elias Tompkins, of Brooklyn, N. Y., for a Design for Heater Fronts.

THE RISE AND PROGRESS OF INVENTIONS.



During the period of Fourteen Years which has elapsed since the business of procuring patents for inventors was commenced by MUNN & Co., in connection with the publication of this paper, the number of applications for patents in this country and abroad has yearly increased until the number of patents issued at the United States Patent Office last year (1859) amounted to 4,538; while the number granted in the year 1845—fourteen years ago—numbered 502—only about one-third as many as were granted to our own clients last year; there being patented, through the Scientific American Patent Agency, 1,440 during the year 1859. The increasing activity among inventors has largely augmented the number of agencies for transacting such business.

In this profession, the publishers of this paper have become identified with the universal brotherhood of Inventors and Patentees at home and abroad, at the North and the South; and with the increased activity of these men of genius we have kept apace up to this time, when we find ourselves transacting a larger business in this profession than any other firm in the world.

We may safely assert that no concern has the combined talent and facilities that we possess for preparing carefully and correctly applications for patents, and attending to all business pertaining thereto.

FREE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable are advised to make a sketch or model of their invention, and submit to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from our long experience, and the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh streets, Washington, by experienced and competent persons. Over 1,500 of these examinations were made last year through this office, and as a measure of prudence and economy, we usually advise inventors to have a preliminary examination made. Address MUNN & CO., No. 37 Park-row, New York.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared on reasonable terms, by sending a sketch and description of the invention. The government fee for a caveat is $30. A pamphlet of advice regarding applications for patents and caveats furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention, if susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition is composed for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fee, by express. The express charges should be prepaid. Small models, from a distance, can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park-row, New York.

REJECTED APPLICATIONS.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief history of their case, enclosing the official letters, &c.

FOREIGN PATENTS.

We are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business we have offices at Nos. 66 Chancery Lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that three-fourths of all the European patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through our Agency the requirements of the different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our branch offices.

CAUTION TO INVENTORS.

Messrs. MUNN & CO. wish it to be distinctly understood that they neither buy nor sell patents. They regard it as inconsistent with a proper management of the interests and claims of inventors, to participate in the least apparent speculation in the rights of patentees. They would also advise patentees to be extremely cautious into whose hands they entrust the power to dispose of their inventions. Nearly fifteen years' observation has convinced us that the selling of patents cannot be conducted by the same parties who solicit them for others, without causing distrust.

BUSINESS CONDUCTED CONFIDENTIALLY.

We would inform inventors that their communications are treated with the utmost confidence, and that the secrets of inventors confided to us are never divulged, without an order from the inventor or his acknowledged representative.

TESTIMONIALS.

Immediately after the appointment of Mr. Holt to the office of Postmaster-General of the United States, he addressed to us the subjoined very gratifying testimonial:—

Messrs. MUNN & Co.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you have discharged your duties of Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy, marked ability and uncompromising fidelity in performing your professional engagements. Very respectfully,

Your obedient servant, J. HOLT.

Messrs. MUNN & Co.:—Gentlemen: It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency, and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully,

Your obedient servant, WM. D. BISHOP.

MONEY RECEIVED

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, Oct. 13, 1860:—

J W., of N. Y., $38; J. B. C., of N. Y., $12; H. C. A., of Ill., $31; A. C., of N. B., $25; J. J. S., of N. Y., $25; R. T. K., of Pa., $30; J. W. K., of Ga., $30; J. H. G., of Ky., $55; B. A. G., of Mass., $30; J. W., of N. Y., $32; G. I. M., of Conn., $30; G. K. W., of R. I., $30; W. C., of N. Y., $30; M. D., of Ind., $30; C. D., of Mass., $15; G. G. L., of Del., $60; J. H. B. S., of Ga., $15; J. B., of Texas, $30; J. G., of N. H., $30; J. M., of Conn., $55; L. A. B., of N. Y., $31; R. H., of N J., $135; C. G., of Pa., $25; R. & W., of N. Y., $25; L. S., of Ky., $25; W. F. K., of Ill., $30; J. C., of Minn., $25; C. W. S. H., of Ill., $10; S. L. W., of N. C., $30; W. H. N., of Conn., $58; C. & S., of Pa., $30; E. D., of N. Y., $31; S. P. P., of N. Y., $30; J. A. G., of Mass., $30; T. J. P., of Ohio, $75; C. W. W., of Mass., $30; A. C. C., of R. I., $25; J. H. D., of Mo., $30; C. R. O., of N. Y., $15; J. R., of N. Y., $25; E. W. G., of Mass., $40; P. M., of Mich., $55; P. K., of Conn., $20; J P. F., of N. Y., $25; T. J. W., of Conn., $25; J. H. B., of N. Y., $15; J. B., of N. Y., $30; J. A. A., of Mass., $30; W. C. E., of Tenn., $25; W. & G., of Va., $20; E. R. P., of N. Y., $10; J. S., Jr., of Pa., $25; J. B. McM., of N. Y., $15; J. D., of La., $25; S. L. B., of S. C., $30; H. M. B., of Ohio, $30.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, Oct. 13, 1860:—

E. W. G., of Mass.; J. W., of N. Y.; W. F. K., of Ill.; T J. W., of Conn.; J. J. S., of N. Y.; J. M., of Conn.; O P., of N. Y. (two cases); J. S., Jr., of Pa.; P. H., of Mo.; A. C. C., of R. I.; J. D., of La.; C. G., of Pa.; R. & W., of N. Y.; J. C., of Minn.; L. S., of Ky.; J. H. B., of N. Y.; C. D., of Mass.; J. R., of N. Y.; J. B. P., of Miss.; H. Van S., of Conn.; G. K. W., of R. I.; L. O. B., of N. Y.; J. H. B. S., of Ga.; J M., Jr., of N. Y.; J. W., of N. Y.; A. C., of N. B.; R. C., of Texas; J W. R., of Ga.; J. P. F., of N. Y.; R. T. K., of Pa.; J G., of Ky. (four cases); J. B. C., of N. Y.; W. C. E., of Tenn.; W. G., of Mass.; C. W. W., of Mass.

Notes and Queries

CORRESPONDENTS sending communications for publication in our columns are requested to avoid writing on both sides of a sheet of paper. This fault, though common to persons unaccustomed to writing for the press, gives great trouble to the printer (especially in long articles), and, when combined with illegibility of handwriting, often causes interesting contributions to be regretfully consigned to our waste-paper basket.

E. B., of Mass.—The Ruhmkorff apparatus is simply an induction coil on a large scale. A common battery may be used in repeating Gassiot's experiments, but success would be doubtful unless you have a very large one. A current of intensity is required. By the flat spiral, we understand a coil like a watch spring. Professor Rogers, of Boston, has a set of Gassiot's tubes.

HUGO, of Pa.—The error of your calculation lies in the supposition that the lower hemisphere attracts your body (B) with the same force as the upper. Sir Isaac Newton was right, and you are wrong. It has before been proposed to carry up condensed gas with a balloon, and dispense with ballast in the way you describe.

C. F., of Mass.—In the process of hermetically sealing fruits, catsup, oysters, &c., it is not the custom to add any substance, unless sirup, to prevent fermentation. Success seems to depend upon having the articles fresh, and excluding all the air. The process of sealing seems quite simple, yet requires a good amount of judgment and dexterity. If you wish to use an antiferment we would recommend the bisulphite of lime.

MINERALOGIST, of Pa.—Dana's is the best treatise on mineralogy.

J. N., of Oregon.—There are several varieties of silver ores, each requiring peculiar treatment. Ore containing silver in the metallic state may be treated precisely like gold ore, viz.: by crushing, washing and amalgamation.

J. S. F., of Ill.—It is not probable that nitric acid would be used for the adulteration of vinegar. Sulphuric acid is readily detected by the addition of a few drops of a solution of chloride of barium. We thank you for the compliment on our amiability. Good-tempered folks live longest and do the most good.

H. E., of N. Y.—About 2 lbs. of shellac to the gallon of alcohol is a good proportion for shellac varnish.

E. H. R., of Iowa.—We have had no experience in fastening leather to iron pulleys which are to be exposed to the weather; but for such a case we would try roughening the metal with acid, and then fastening the leather with india-rubber cement. You may find it better, instead of the leather, to use an india-rubber band, which you can easily stretch over the pulley, and which will require no cement.

M. B. T., of N. J.—The term "improved article of manufacture" implies that the party asks a patent, not for an entirely new thing, but for the thing in its improved state.

J. J., of Conn.—The difficulty of casting zinc on steel arises chiefly from the fact that these metals expand by heat at very different rates.

A. B., of Iowa.—You ask how it is that a high pressure steam engine will work at all, unless the steam is of a greater pressure than 15 lbs. It will not work. No steam will be made until the water receives sufficient heat to overcome the pressure of the atmosphere. As the pressure of the atmosphere varies (which it does at different elevations above the level of the sea) water boils at different temperatures. Under an atmosphere that exerts a pressure of 2¾ lbs. to the square inch, water boils at 136° Fah.; under 8 lbs., at 192°; under 15 lbs., at 212°; under 33 lbs., at 255°; under 60 lbs., at 292°, and so on.

R. S. C., of Wis.—The device described by you is very ingenious, but it is not new.

B. L., of Mass.—A patent could be obtained for the combination for the particular purpose specified, though the several parts have long been known. In regard to the value of the invention you must be your own judge. Our own opinion is that it would depend on the way you managed it.

G. P. N., of Tenn.—The north star is not exactly in the pole of the heavens, but revolves daily around the true pole with all the rest of the stars, as well as the sun and the moon.

R. T. K.—You will find your letter on page 243 of the present volume. Our own articles, as well as those of our friends, have frequently to lie over two or three weeks after they have been passed to the printer.

C. B., of Penn.—The air is not composed of the same substances as water. Air consists principally of oxygen and nitrogen in the proportion of about ¼ oxygen to ¾ nitrogen, while water is composed of hydrogen and oxygen in the proportion of 1 lb. of hydrogen to 8 and 13-100 lbs. of oxygen.

L. M. E., of N. C.—To reduce the degrees of the centigrade thermometer to those of Fahrenheit, multiply by 9, divide by 5, and add 32. The zero of the centigrade is at the freezing point of water, and the boiling point is at 100°.

S. S., of N. Y.—The idea of your invention is a good one, but you ought to work it into more complete shape before applying for a patent.

O. C. P., of N. J.—The water gas of Narbonne is entirely different in principle from that of Philadelphia. In the French system, hydrogen gas is simply used as fuel for heating a wire to a white heat, and the light comes from the wire.

S. S., of Vt.—The specimen you send us is a very good clay, of which much is found in your State. The potteries of Bennington are well-known here.

F. G. A., of N. Y.—Our "Talks with the Boys" will be continued, though we may not write them every week during the publication of Faraday's lectures.

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USEFUL HINT TO OUR READERS.

BOUND VOLUMES.—Persons desiring the first volume of the New Series of the SCIENTIFIC AMERICAN can be supplied at the office of publication, and by all the periodical dealers; price, $1.50; by mail, $2, which includes postage. The volume, in sheets, complete, can be furnished by mail; price $1. Vol. II. is now bound and ready for delivery. The price for this volume is the same as that charged for Vol. I.

SUBSCRIBERS TO THE SCIENTIFIC AMERICAN who fail to get their papers regularly will oblige the publishers by stating their complaints in writing. Those who may have missed certain numbers can have them supplied by addressing a note to the office of publication.

GIVE INTELLIGIBLE DIRECTIONS.—We often receive letters with money inclosed, requesting the paper sent for the amount of the enclosure, but no name of State given, and often with the name of the Post-office also omitted. Persons should be careful to write their names plainly when they address publishers, and to name the Post-office at which they wish to receive their paper, and the State in which the Post-office is located.

RATES OF ADVERTISING.

THIRTY CENTS per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns; and, as heretofore, the publishers reserve to themselves the right to reject any advertisement sent for publication.

THE BLANDY PORTABLE STEAM SAW MILL, after a fierce contest with numerous competitors, having more powerful machinery, was awarded the first premium at the United States Fair, at Cincinnati, Ohio, 1860, as the smoothest working, easiest handled and fastest cutting mill. We cut, in the presence of the awarding committee and thousands of spectators, 6755/6 feet first-class inch lumber, out of two logs, in 8 minutes 15 seconds. All the machinery worked by two hands. Also the first premiums at Ohio State Fairs for 1857, 1858 and 1859, and is the national premium and champion mill. The Blandy Patented Portable Steam Engine was described and illustrated on page 273, Vol. II. (new series), of the SCIENTIFIC AMERICAN. Send for circulars.
17 4c H. & F. BLANDY, Zanesville, Ohio.

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17 13*

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OFFICE OF THE McNARY KNITTING MACHINE COMPANY, Sept. 29, 1860. The Office of this company has been removed to No. 25 William-street, room No. 25, rear building. 16 2*

STEVENSON'S JONVAL TURBINE WATER WHEELS, which gave a useful effect of .9077 per cent of the power employed at the late trial of water wheels at the Fairmount Works, Philadelphia, March 9, 1860, are manufactured solely by J. E. STEVENSON, Novelty Iron-works, New York. 16 4*

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14 13*

NOTICE.—WHEREAS APPLICATION HAS been made to the committee (who have advertised extensively, offering premiums for lamps designed for the burning of whale oil) asking further time for the completion of lamps for examination, therefore the committee have extended the time from August 30, 1860, to and including October 1, 1860.
JOS. GRINNELL, Chairman.
MATTHEW HOWLAND, Secretary.
New Bedford, 8th mo. 24th, 1860. 14 4*

BACK NUMBERS AND BOUND VOLUMES OF the NEW SERIES of the SCIENTIFIC AMERICAN can always be had of A. WINCH, No. 320 Chestnut-street, Philadelphia, Pa. 11 12*

GALVANIZED IRON PIPE—CHEAPER AND better than lead for water. Is used in the cities of Brooklyn and Hartford for water pipes in dwelling houses. Sold at wholesale by JAMES O. MORSE & CO., No. 76 John-street, New York. 10tf

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PORTABLE STEAM ENGINES, COMBINING the maximum of efficiency, durability and economy with the minimum of weight and price. They received the large gold medal of the American Institute, at their late fair, as "the best Portable Steam Engine." Descriptive circulars sent on application. Address J. C. HOADLEY, Lawrence, Mass. 1 29*

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A MESSIEURS LES INVENTEURS—AVIS IMportant.—Les inventeurs non familiers avec la langue Anglaise et qui prefereraient nous communiquer leurs inventions en Francais, peuvent nous addresser dans leur langue natale. Envoyez nous un dessin et une description concise pour notre examen. Toutes communications seront recues en confidence.
MUNN & CO., Scientific American Office, No. 37 Park-row, New York.

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NEW ECONOMICAL PAINT WITH THE OXI-CHLORIDE OF ZINC.

This paint is a mixture of oxi-chloride of zinc and alkaline solutions. There are two ways to manufacture it.

1. Take chloride of zinc prepared by the ordinary process, and free of acid; concentrate the solution so that when cold it marks 58° Beaumé. Then prepare a solution containing, for 30 gallons, 4½ pounds carbonate of soda; mix the two solutions in the proportion of 9 pints of the first for 3 gallons of the second. This liquid, so prepared, is mixed with the white of zinc, to form a paint of the ordinary consistence, which is applied immediately. Analysis shows that in the above proportion there is one equivalent of chloride of zinc for one equivalent of oxyd.

2. If you use sulphate of zinc, it must be a solution marking 40° Beaumé, and add, for every gallon, 1 ounce borate of soda. These solutions could be kept for a long time, but the white of zinc must be added only when ready for use, and you must prepare only the quantity sufficient to work one hour.

This paint gives a very fine white; it covers as well as oil painting. It is very adhesive and solid; its price is half that of the oxyd of zinc; it is without smell; it may be applied on wood, iron or cloth. It does not, however, mix well with coloring matters, and must be applied only as white paint.—*Professor H. Dussauce.*

THE NOVEL FEAT IN ENGINEERING.

Our readers may remember that our Texas correspondent described the crossing of the Brazos river, by sweeping down the bank some thirty or forty feet and rising on the opposite side. In the Richmond (Texas) *Reporter* of the 22d ult., we find the following, which we suppose must refer to the crossing described by our correspondent:—"We learn that one man, John Farrel, was killed, and the conductor, Mr. Adams, and Mr. Brush, were wounded, the latter seriously, by the following sad occurrence:—Yesterday, as the up train was passing over the Brazos bridge a portion of the bridge gave way, and a freight, baggage and lumber car fell through, making a total wreck of them. The passenger car, containing quite a number of passengers, was only saved from precipitation into the river—where all would inevitably have been lost—by the disconnection (from the concussion) of the locomotive from the train."

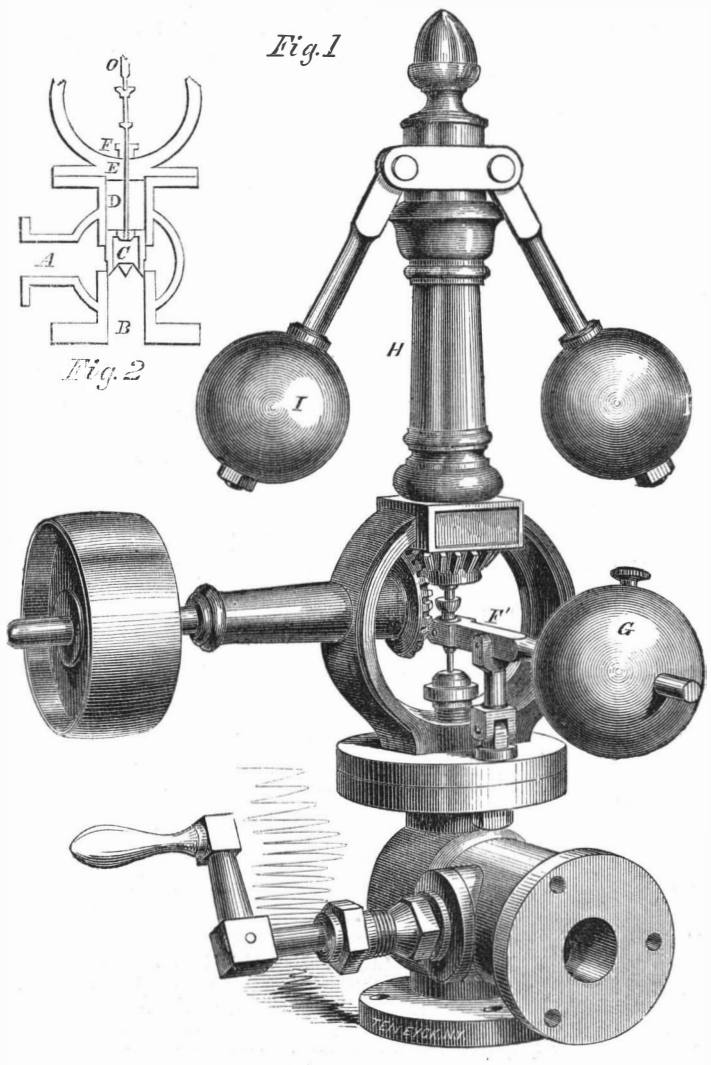
GREAT FEAT OF THE BLANDY STEAM ENGINE.

As our readers may remember, we presented in our last volume, on page 273, an illustration of the steam engine manufactured by H. and F. Blandy, at Zanesville, Ohio. By the Ohio papers we see that at the great trial of portable steam saw mills, at the United States Fair at Cincinnati, the Blandy mill distanced all competitors, performing the unparalleled feat of sawing 675½ feet of lumber by single lines, in 8 minutes 15 seconds. This mill employs two saws, one above the other, but both cutting in the same line, so that only one board is sawed at a time. We hear of these admirable mills all over the country, from New York to the interior of Texas. An advertisement of Messrs. Blandy may be found in our advertising columns.

SAWDUST AS A BEDDING AND AS MANURE.—"Dry sawdust," says a coreespondent of the *New England Farmer*, "is one of the best articles for bedding horses and cattle, to take up the urine and keep the cattle clean. But hard wood is the best, and should be used freely for bedding, even if you have to go miles for it; it will answer every purpose of going to Peru after guano." Such sawdust put on land right from the saw, especially on a thin, dry soil, is of considerable value, as an experiment mentioned by the writer above quoted proves.

IMPROVEMENT IN GOVERNORS FOR STEAM ENGINES.

In steam engine governors, of all kinds, there are necessarily a number of separate pieces, acting on each other by means of numerous joints, sliding surfaces and bearing surfaces, all of which, in order that the governor may not be impaired in its action, and not have its sensitiveness diminished by undue friction, must have a certain degree of looseness, the whole of which, combined, makes up a considerable quantity of "lost motion," as it is called, which the governor must take up before a change in its velocity will act upon the valve. It is the intention of the invention here illustrated to obviate this difficulty, and thus give greater promptness to the action of the governor.



GARDNER'S GOVERNOR FOR STEAM ENGINES.

In our illustrations, Fig. 1, is a perspective view of the whole governor, and Fig. 2 is a vertical section of the valve and its connections; *a* is the pipe leading from the boiler; *b*, the opening into the steam chest; and *c*, the valve, with openings through its upper part into the chamber, *d*, above it, so that the pressure of the steam upon it may be balanced. It fits upon a conical valve-seat, and its lower edge is serrated, as shown, so that the higher it is raised the larger is the opening into the steam chest. The valve-stem, *e*, is loosely connected to the short arm of the lever, F (Fig. 1), in such manner that the heavy ball, G, tends to raise the valve from its seat. The top of the valve-stem is fashioned into a cup, which serves as a step for the spindle, *o*, which passes through the standard, H, and is pressed downward by the opening apart of the balls, I I. This spindle is surrounded by a hollow sleeve, upon which is secured the pinion by which the rotation of the balls is effected.

It will be seen that, besides accomplishing in the fullest manner the main purpose of the invention, this governor acts with very little friction, and that it is of the simplest character. By attaching a cord to the long arm of the lever. F, the engine may be stopped very promptly on emergency, without the delay of calling the engineer. The speed of the engine is regulated by adjusting the ball, G, in the proper position upon the lever, F.

The patent for this admirable invention was granted on August 14, 1860; and further information in relation to it may be obtained by addressing the inventor, Robert W. Gardner, at Quincy, Ill.

NATURAL LIFE OF THE HONEY BEE.—The following communication is made to the *Country Gentleman and Cultivator*, by M. M. Baldridge, of Middleport, N. Y.:—The majority of persons who have the care of bees entertain the idea that the worker-bees live many years. Their conclusion is drawn from the fact that colonies sometimes inhabit the same domicile a long period—15 or 20 years—never thinking that, as fast as the bees die off naturally and from other causes, they are continually replaced by a new progeny. The natural life of the honey-bee worker does not exceed six months, and, from recent experiments, I believe, does not exceed, in the summer season, three months. By the aid of the Italian or Ligurian bee, this may be easily and satisfactorily tested. On the 2d of July last, I gave to a very powerful stock of native bees a pure Italian queen. To-day, September 15, this stock was examined to ascertain what proportion of the bees were of the Italian race. Taking out the frames one by one, both sides of the comb were carefully inspected, and, so far as I could ascertain, at leat nine-tenths of the bees were purely Italian. Also, on the 17th of of July, I gave an Italian queen to another stock of native bees. This stock was also examined to-day in the presence of a friend, who assisted me in the examination. Examining the combs, as before, we did not find in this stock *a single native bee!* This change has taken place, as will be observed, in less than two months. Since the 17th July, I have taken out of this colony combs of maturing Italian brood—giving them to other stock—more than enough to make a good colony of bees. Thus, it will be seen that the natural life of the honey-bee, in either of these instances, would scarcely exceed three months; also, that it requires only a few months to change an apiary of native bees to those of the Italian race.

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